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Culture, Tourism and the Centre for Education Statistics

Moving Through, Moving On: Persistence in Postsecondary Education in Atlantic Canada, Evidence from the PSIS

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Ross Finnie, University of Ottawa

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Note of appreciation

Canada owes the success of its statistical system to a long-standing partnership between Statistics Canada, the citizens of Canada, its businesses, governments and other institutions. Accurate and timely statistical information could not be produced without their continued cooperation and goodwill.

Acronyms

C-IDEA	Center for Institutional Data Exchange and Analysis
CSRDE	Consortium of Student Retention Data Exchange
CAMET	Council of Atlantic Ministers of Education and Training
GRLS	Generalised Record Linkage System
GPA	Grade point average
K-12	Kindergarten to Grade 12
LAD	Longitudinal Administrative Databank
L-PSIS	Longitudinal Postsecondary Student Information System
MPHEC	Maritime Provinces Higher Education Commission
MESA	Measuring Effectiveness of Student Aid
NGS	National Graduates Survey
PSE	Postsecondary education
PEPS	Postsecondary Education Participation Survey
PSIS	Postsecondary Student Information System
SIN	Social Insurance Number
SES	Socio-economic status
SLID	Survey of Labour and Income Dynamics
YITS	Youth in Transition Survey

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Executive summary

This report provides new and unique empirical evidence on Postsecondary Education (PSE) pathways in Atlantic Canada based on the Postsecondary Student Information System ("PSIS") dataset. The PSIS has been developed at Statistics Canada using administrative files on students provided to them in a standard format by individual (public) post-secondary institutions. Atlantic Canada is especially well positioned to take advantage of the PSIS due to their almost universal participation in the PSIS project since 2001 through 2004, the period covered by this analysis.

For this project, a given individual's records have been linked in each reporting year (where the person has multiple programs) and over time (when the person appears in the data more than one year), thus allowing us to identify – and track – students' PSE pathways. Most importantly, and one of the particular (and unique) strengths of the PSIS, is that this broad coverage and longitudinal linking allow us to track students as they move across institutions. This tracking includes both those who continue in their studies from one year to the next while making such a change in institution (i.e. "switchers"), as well as those who drop out and then come back ("returners"). We thus obtain a much more complete and accurate view of persistence patterns, and are able to correct the more limited perspectives available to date, based mostly on the data of given institutions (i.e., where students movements across institutions are not observed).

While the PSIS includes records for students of all types and characteristics, our focus is on those who start new programs over the period in question, and then seeing who, in each year of their studies, i) graduates, ii) continues in the same program (defined as not having graduated but still being enrolled at the same institution), iii) switches programs (i.e., continues in PSE but at another institution, possibly at a different level or even in a different province), or iv) leaves PSE without graduating.

We also identify the number of leavers who return to PSE after leaving, again whether at the original institution or at another, at the same or different level, in the first province or another.

Finally, the analysis also includes a tracking of those observed to graduate from a program over this period to see how many continue in their studies, either directly or after taking a short break – and if so, where they do so (level of studies, province, etc.)

The study covers PSE students in public institutions at all levels of study in Atlantic Canada: college, bachelor's, master's, Ph.D., and first professional degrees. The emphasis here, however, is on college and bachelor's students for reasons related both to sample sizes, and the nature of the profiles and presumed related policy concerns.

The paper also attempts to generally identify the strengths and limitations of the PSIS, as well as point the way to further avenues of investigation.

Stemming from the unique attributes of the PSIS data, the study is the first of its type for the region. It is, however, in most respects also unique in Canada, and even at the international level. The results reported here might therefore be of interest to academics, institution administrators, postsecondary policy makers, and others with an interest in these dynamics, including even students themselves, not only in Atlantic Canada, but also across Canada, and possibly even in other countries.

Our analysis is conducted using a number of different samples, which represent different conditions being placed on the students whose dynamics we study. Our preferred samples impose a tighter set of rules in order to be more sure that we are including students at the start of their programs. Further restrictions allow us to focus on those who age 17 to 20 at the start of their studies (and therefore even more likely to be just starting their PSE careers), but we report results for the broader samples we define as well.

Our major findings regarding the basic persistence rates include the following:

- Starting at the university level, and focussing on our narrowest samples (first program, age 17 to 20 when they started), we find that the first year "dropout rate" from the point of view of individual institutions (i.e., including "switchers" as well as true "leavers") is 20.2 percent, which compares closely to the bits of existing evidence on this dynamic.
- But some of these "leavers" are in fact *switchers*: 5.1 percent in absolute terms, or 25.2 percent in relative terms when compared to all those who leave a given institution (i.e., as compared to the switcher and leaver totals noted above). We thus see that ignoring moves to other institutions leads to substantial bias in the estimates of those who actually leave PSE. "True" leaving rates (i.e., from PSE entirely) are left at 15.1 percent.
- Switching and leaving rates are considerably lower in the second year as compared to the first, as expected, but remain substantial. For example, and still using the age 17 to 20 sample, leaving rates decline from 15.1 percent to 11.7 percent, while switching rates go from 5.1 percent to 4.2 percent.
- Expanding the list of programs to which university students are considered "switchers" (rather than leavers) to include non-PSE programs at PSE institutions (e.g., short courses, language training, and so on) reduces the leaving rate somewhat further, to 13.8 percent, and increases the continuing rate and switching rates commensurately.
- From this perspective, the "drop out rate" in the first year goes from 20.2 percent when both leavers and switchers are added together (i.e., "the institution's perspective") and a narrower range of programs are included for switchers, to 13.8 percent when only true leavers are considered and switchers include students in non-PSE programs at PSE institutions. This represents a reduction in the estimated drop-out rate of 6.4 percentage points in absolute terms, or 32 percent in relative terms. The PSIS data thus give a substantially different perspective of the number of PSE leavers relative to what would be estimated with institution-specific data.

- Leaving rates are considerably higher among college students than bachelor's students: 22.6 percent (college) versus 15.1 percent (bachelor's) in the first year. Also, switching is almost negligible for college students, whereas the numbers are substantial for bachelor's students.
- Cumulative transition rates which essentially add up the record for the different years as a student progresses through their program (while taking account of the "censored" nature of the data over time) are also shown.
- Not surprisingly, leaving rates are much lower among students in master's, first professional degree and Ph.D., programs: in the first year (and based on somewhat different sample restrictions as appropriate) they are 9.5, 5.5 and 6.3 percent at the three levels, respectively. Switching is almost non-existent.
- Men leave at considerably higher rates than woman at the university level (a cumulative difference of 28.4 percent versus 21.9 by the end of year 2), whereas women's switching rates are, conversely, a bit higher than men's. The patterns by sex are, however, more mixed at the college level: their cumulative leaving rates by the end of year 2 are almost identical (33.1 and 33.6 percent respectively).
- Leaving rates rise substantially with age for bachelor's students, but *switching* rates *decline* with age. For college students, leaving rates are slightly lower for older students (switching rates remain negligible).
- By province, the differences are perhaps surprisingly small given the varying nature of the different PSE systems in terms of the number of institutions in each province, their locations, tuition fee structures, and more. Leaving rates among university students in Newfoundland and Labrador, Prince Edward Island, and New Brunswick are clustered within a few points of each other, while Nova Scotia has somewhat lower rates. Switching rates are very similar across all four provinces. At the college level, first year transition rates are also similar across jurisdictions, except for Prince Edward Island, whose rates are lower.

Looking at where switchers go, we find the following:

- Among bachelor's students (and focusing still on the 17 to 20 age group – patterns are roughly the same for the broader sample), switching rates are 5.1 in the first year (and slightly lower in the second). Of these, two-thirds stay at the same level of studies in their new programs, and among this group, a somewhat greater share remain in the same province as compared to the number who leave (1.9 percent versus 1.5 percent in actual percentages).
- Of the remaining one-third of first-year switchers who change their level of studies from university to college, most stay in their original province (1.4 percent), while the remainder (just .3 percent overall) change both level of study and the province in which they pursue those studies.
- Overall, then, just 1.8 percent of all first year bachelor's students move to study in a different (Atlantic) province at either the same level of study or at the college level by the beginning of their second year. In short, inter-provincial mobility among bachelor's students in Atlantic Canada appears to be quite low.
- As previously mentioned, there are not many switchers at the college level at all: for example, just 1.3 percent and .8 percent in the first two years among the age 17 to 20 group.

How many return to PSE after leaving? Our results indicate the following:

- In the first year, 25.0 percent of all bachelor's leavers (still focusing on the age 17 to 20 sample) return to PSE. Overall leaving rates are, therefore, substantially overstated when this group of "leaver-returners" is not taken into account. Otherwise put, "permanent" leavers are considerably fewer in number than the number of "temporary leavers" would indicate. – the well-known, but little quantified, "stop-out" phenomenon.
- Of those who return, about half (11.9 percent of the 25.0 percent total) go back to the same institution (and same level – i.e., they stay at university). Another 5.8 percent stay at the same level (i.e., university) but change institution, these about evenly split between those who stay in-province (2.8 percent) and those who move to another province within Atlantic Canada (3.0 percent). A final 7.4 percent change their level of study (i.e., they switch to college), with most of these (5.7 percent) staying in-province, the remaining 1.7 percent changing both level and province.
- Among college leavers, a much smaller proportion of leavers subsequently return to their studies: 11.5 percent (age 17 to 20) and 10.4 (all ages) percent in the first year we observe here. Of these, most return to the same institution (and level), 8.5 and 8.4 percent, respectively. Of the others, the greatest number change level (i.e., switch to university – 2.0 and 1.4 percent), almost all in the same province. Another small group goes to a different institution at the same level, almost all in another province (.9 and .6 percent).

Our study also looks at how many students observed to graduate over the period in question continue in their studies. We find the following:

- The rates of continuing in PSE are relatively high, even though new programs taken out of the province are not counted due to the restriction of the PSIS file used here to the Atlantic region. By three years after graduating, 36.5 percent of bachelor's students had enrolled in another PSE program, while 30.3 percent of college graduates had done so. The great majority of these (at both levels) enrolled in their new programs in the first year following graduation: "gap years" do not appear to be particularly common at the PSE level – although it is certainly a path some follow.
- Of those bachelor's graduates who go on, however, 34.8 percent do so in non-regular PSE programs, which include language courses, other specific skill development courses, and other such things. In short, a substantial number of bachelor's graduates appear to return to their studies to top up their skills or otherwise pursue their studies outside a regular PSE program. Just 4.0 start of these bachelor's graduates start a new (regular) PSE program at the college level, which seems like a surprisingly low number given all the attention paid to this path in the popular press.
- Among college graduates, 39.5 percent of the re-enrolled are in new regular PSE college programs, 20.3 percent are at the bachelor's level, another 17.8 percent are in "below PSE" programs and 22.1 percent are in non-regular programs at PSE institutions. These are interesting and potentially important pathways that probably merit further analysis.

With these results in hand, the paper reports on a number of checks of these findings that were carried out, including comparing the results to those generated with the Youth in Transition Survey (YITS), which is another Statistics Canada database that is also well suited to the study of persistence in PSE (albeit in a different way given its national coverage and survey underpinnings). Those checks were generally reassuring regarding the quality of the PSIS data (and the structure of the analysis).

Finally, the report also points to a number of possible directions for future work. One of these relates to the possibility of i) making further checks, and ii) extending the analysis based on linkages of the PSIS with two other Statistics Canada databases. One of these is the YITS, which would allow a researcher to track individuals simultaneously in the two files, thus precisely identifying any differences in the PSE information that are observed.

The other is the Longitudinal Administrative Database, based on individuals' tax files. A LAD-PSIS linkage would again allow for further checks of the PSIS, and also permit a student's family background information (family type, income, etc.) to be added to the analysis, as well as allow individuals to be followed after leaving PSE.

Another suggested general line of research is to use econometric modelling methods to analyse the persistence patterns identified here.

Many other possible lines of enquiry could surely be identified based on the unique attributes of the PSIS, these topics including not only those that continue in the persistence topic, but also others related to other PSE issues. It is hoped that this paper has provided a useful first step which has generated some interesting and useful new evidence on persistence in PSE in Atlantic Canada, has offered a helpful assessment of the main strengths and limitations of the PSIS data, and has pointed the way to new work that could be undertaken.

Section 1 Introduction

When students begin their postsecondary education (PSE), their subsequent schooling can take myriad pathways. Some students continue in the same program until graduation. Others switch to a different program at the same institution. Some change institutions, either at the same level of study (college, university, private training), or at a different one. Still other students abandon their studies, some altogether and others to return at a later date. Some finish one program and stop there, while others continue on with their studies, either directly or after a break.

Understanding such pathways is important for a variety of reasons to university and college administrators, to Kindergarten to Grade 12 (K-12) and postsecondary education policy makers, to academics, and to others, including parents and students themselves. Our understanding of these processes is quite limited, however, largely due to the general shortage of data suitable for studying dynamics that can be both detailed and complex.

The general objective of this paper is to provide new and unique empirical evidence on PSE pathways in Atlantic Canada based on the Postsecondary Student Information System (PSIS), which has been developed at Statistics Canada from student administrative files provided by postsecondary institutions. Atlantic Canada is especially well positioned to take advantage of the PSIS – for this study as well as for others that could be undertaken on this same topic or others – due to their strong participation rate in PSIS since 2001. The longitudinal linking of student records that has been carried out by Statistics Canada for this project broadens the possibilities for further research (see section 4.1 for a discussion of the longitudinal linked file).

The PSIS data used in this project covers four reporting years: 2001/2002 through 2004/2005 (more years are scheduled to be added on an on-going basis).[1] Most importantly for the purposes of this project, the PSIS data include one record for every student for every PSE program in which they were enrolled in a public PSE institution in Atlantic Canada for each of the four years covered by the data. This is possible only because of the almost complete coverage of the PSIS throughout Atlantic Canada regardless of the level (college or university), institution, or province of study.

This information has allowed for a longitudinal tracking of students which allows us to follow individuals from their point of entering PSE through the ensuing PSE dynamics of primary interest, which we have categorised as i) graduation, ii) continuing their studies at the original institution, iii) switching to another institution, possibly at a different level (i.e., college versus university) or even in another province (as long as it is in Atlantic Canada, which is the geographical limit of the longitudinal linked file), and iv) leaving PSE without graduating.

We also identify the proportion of leavers who return to PSE after leaving, again whether at the original institution or at another, at the same or at a different level of study, in the first province of study or in another within Atlantic Canada.

Finally, the analysis also includes a tracking of those observed to graduate from a program over any of these fours years to see how many continue in their studies – either directly or after taking a short break – and if so, where they do so (level, province of study, etc.).

The data utilized for this analysis covers PSE students attending public institutions at all levels of study: college, bachelor's degrees, master's students, Ph.D. candidates, and those entering first professional degrees. The emphasis is, however, on college and bachelor's students, with the latter three groups (master's, Ph.D., first professional programs) included only in the first part of the analysis (the initial hazard transition rates in the first years of their programs). This focus on college and bachelor's students is due to, first of all, the relatively small sample sizes for the other groups, but also due to the nature of PSE experiences at these levels (e.g., master's, Ph.D. and professional students are much less likely to switch programs or leave PSE once they have started). Finally, students at the college and bachelor's levels are presumably the main focus of interest and concern for administrators, policy makers, and others, particular in terms of the "persistence" dynamics focussed on in this study, precisely because of their higher rates of switching and dropping out.

In covering this full set of PSE dynamics for the whole of Atlantic Canada with a fully representative sample (essentially the entire *population* of students), this study is the first of its type for the region. It is also, in most respects, unique in Canada, and is notable even at the international level.[2] The results reported here might therefore be of interest to academics, institutional administrators, postsecondary policy makers, and others with an interest in these dynamics not only in Atlantic Canada, but across Canada, and possibly even in other countries. We hope the paper will, in addition, illuminate the principal strengths – as well as the limitations – of the PSIS data, and thus help identify not only the potential extensions of the current work, but also other potential research projects that could be undertaken with these new and extremely rich data.

The paper is organised as follows. In Section 2, we review the previous research on persistence in PSE with a focus on Canadian work. Section 3 explains the methodological approach. Section 4 describes the data and samples used. In Section 5 the empirical findings are presented. Finally, Section 6 summarises the main findings, places them in a policy context, and mentions a number of possible routes for further research.

Section 2 The literature

The persistence literature can be classified into two parts: that which focuses on overall rates of graduating, continuing, switching, and leaving (or some subset of those outcomes), and that which analyses these patterns by various characteristics of the student, their situation, and other relevant factors. We discuss each of these literatures in turn, with an emphasis on the Canadian record. But we begin the section by placing this literature in the context of the data required to study PSE pathways, since it is the general dearth of such data that has generated a literature that is so relatively scant and otherwise limited, and which points to the unique opportunities opened up by the creation of the PSIS dataset.

2.1 The data required to study persistence in PSE

Study after study has pointed to the benefits accruing to PSE graduates and the key role played by PSE graduates in a nation's economic performance[3]. Yet it has been increasingly recognised that access to PSE – typically defined as entering the PSE system at some point – is but the first step on the path to graduation, and that persistence – typically defined as whether the student continues in their studies after entering PSE – is the required follow-through that is necessary for the full benefits accruing from PSE to be realised, both for the individual student and at the broader level (e.g., the nation's economic performance).[4]

While many studies have been carried out on access to PSE, persistence in PSE has been studied to a much lesser degree both in Canada and in other countries.[5] There are two main reasons for this. The first is that concerns that persistence might be a problem are relatively new, so there has been little in the way of a driving force to undertake studies of persistence. The second is that persistence is essentially a dynamic process, and studying it is therefore much more demanding in terms of the associated data requirements, especially because the data meeting those requirements have been in short supply.[6]

These data requirements include, at a minimum, the longitudinal tracking of substantial numbers of students through their persistence dynamics with sufficient detail on their PSE trajectories to identify – at any point in time – who graduates, who does not graduate but continues on in their programs, who switches programs, who leaves, and other related pathways.

It is also valuable to have as much further information as possible on students and their schooling experiences in order to deepen any analysis. Such characteristics would include basic demographic characteristics (sex, age, etc.), family and schooling backgrounds (e.g., parental income and education levels and how the student did in high school), attitudes regarding school that might affect persistence (do they think school in general, and PSE in particular, is important?), PSE program characteristics (level of study, major, current year of study), school performance while in PSE

(grades, academic and social engagement), and other attributes to which it would be interesting to link persistence rates.

The longitudinal tracking requirement is critical because it is inherently difficult to analyse the persistence process in the absence of such data. Cross-sectional data can give only a snapshot of certain limited aspects of the processes in question, and tend to lack the underlying sample frames and information required to build the desired sorts of samples of students and properly analyse these dynamic processes. For example, while Statistics Canada's Postsecondary Education Participation Survey (PEPS), which focuses on 18 to 24 year-olds, is well suited to the study of *access* to PSE, its static nature severely limits its potential for the study of persistence.

Yet such longitudinal data are in short supply. General longitudinal databases such as the Survey of Labour and Income Dynamics (SLID) here in Canada, tend to lack the required sample sizes of students and detailed PSE information required to study persistence in PSE in anything but a very limited way. Historically, there has been a complete lack of longitudinal databases focussed on youth, or students more specifically, such as would allow for such studies.

Neither have PSE student administrative databases been, in general, sufficiently developed, nor where they have existed have they been broad enough in their coverage to capture students as they move across institutions, including when they return to their studies after any break. Hence the general lack of analyses of persistence in PSE and PSE pathways to date in Canada as elsewhere.

Data from the longitudinal Youth in Transition Surveys (YITS-A and YITS-B) have begun to be made available to researchers recently and are the major exceptions to these rules. These YITS surveys (both YITS-A and YITS-B) are, in fact, extremely well-suited to the study of persistence patterns due to their focus on the youth population, their detailed tracking of PSE profiles, and the detailed information they possess on individuals' schooling experiences, abilities, attitudes, and backgrounds. As a result, research on persistence based on the YITS is now starting to emerge.[7]

But the YITS, too, have limitations. In particular, they lack the sample size required for more detailed analysis of certain pathways except at the national level. Neither do they possess the wealth of institution-based information available in the PSIS. Finally, being based on surveys rather than administrative data (like the PSIS), the YITS data are subject to selection and other kinds of response bias. The two (YITS and PSIS) are, in the end, complementary for studying persistence in PSE. References to various YITS results will, therefore, be provided for the sake of comparison below.

2.2 Overall persistence rates

Principally due to the historical lack of relevant data, the relatively few existing studies on persistence that have been carried out in Canada have focussed on the experiences of students at individual postsecondary institutions. Not only are the findings in these cases restricted to those specific institutions, which means they are not necessarily generalisable to the general population, they also fail to capture students who continue in their studies at other institutions – a major shortcoming for the reasons mentioned above.[8]

In this context, the existing persistence literature in Canada includes Gilbert (1991), who estimates the measured five-year dropout rate for Canadian PSE students who entered the University of Guelph in 1985 to be 42 percent, a figure which is close to the six-year dropout rate of 46 percent for the 1994 cohort reported by the Consortium of Student Retention Data Exchange (CSRDE) for (principally) U.S. colleges and universities (CSRDE, 2001b).[9]

Wong (1994) finds an average first-year dropout rate of 24 percent for 13 Canadian universities, which is moderately higher than the 20 percent first-year dropout rate reported by CSRDE (2001a) for its 1999 cohort. Combining the findings from Gilbert and Wong, it appears that students in Canada are most likely to leave PSE between the first and the second year, after which the probability decreases substantially.

In a broader study of all students entering Ontario universities to pursue bachelor's or first professional degrees (note the mix of programs) from 1980 to 1984, Chen and Oderkirk (1997) find that 68 percent had graduated from their initial programs by 1993. (This represents different numbers of years after starting for the different cohorts included in the sample, but most students could reasonably be expected to have finished their studies by this time.) Another 30 percent had not completed their programs and were no longer enrolled in an Ontario university. The remaining 2 percent had not completed their programs but were still enrolled in an Ontario university.

While generating some interesting numbers, the study is restricted to an analysis of the record for students enrolled at Ontario universities, while colleges are also omitted, so it misses those students who move from university to college, as well as those who move outside of Ontario, thus biasing persistence rates downward when thought of in a more general perspective. Also, these data are now quite old, and much has changed in the postsecondary system, including in Ontario, since 1980 to 1993.

2.3 Who leaves and why: factors that influence persistence decisions

There are two well known and broadly used theoretical models in the persistence literature. The first is Tinto's (1975, 1993) model of "student integration", according to which students enter PSE with various pre-entry characteristics, such as age, race, gender, family structure, parental education attainment, high school preparation, and their skills and abilities. These factors contribute to the formation of their initial goals and level of commitment to their studies. Once enrolled, students then begin to have their specific institution-related PSE experiences, which include their level of academic and social engagement and their academic performance. Students' initial goals and commitments are then influenced and modified by these post-entry experiences. These various factors are then taken to determine persistence.

The second well known model is Bean and Metzer's (1985) "student attrition model". The main difference between these two models is that the student attrition model introduces factors external to the institutions, such as finances and peer affects. The student integration model also regards academic performance as an indicator (or determinant) of academic integration, whereas the student attrition model regards PSE experiences as outcomes (Cabrera, Castaneda, Nora, and Hengstler, 1992) on the grounds that, for example, lower grades can be a symptom of an individual's

detachment from school as they begin the process which leads to their leaving.

In summary, these two models both posit that persistence decisions are affected by both pre-entry characteristics and post-entry experiences, but differ in what they include in the latter, and their interpretation of some of the related effects.

In the empirical literature, however, there is no consensus on who drops out and why. In their review of the literature, Grayson and Grayson (2003) say that "...it is difficult to tell if different results of various studies reflect real differences in explanations for attrition or are simply artefacts of different methodologies...it [therefore] makes more sense to examine findings of individual studies in their own right rather than attempting to fabricate generalizations about attrition." This statement obviously points to the need for more empirical work, especially if it employs a dataset that is well suited to the relevant estimation issues, is broadly representative, and uses an appropriate methodology.

As for that more detailed literature, in the richer U.S. record, Horn (1998) uses the Beginning Postsecondary Student Longitudinal Study data to find that the educational attainment of a student's parents is related to persistence, with students whose parents received no education beyond high school being about twice as likely to drop out at the end of the first year as those with parents with a college degree, and this gap is maintained in the following years. The U.S. literature also suggests that students who drop out of their PSE appear to have been less academically prepared for their studies to begin with than those who stayed. For example, using survival analysis techniques similar to those employed here on a sample of 8,867 undergraduate students at Oregon State University between 1991 and 1996, Murtaugh, Burns, and Schuster (1999) find that PSE dropout rates decrease as high school GPAs of those entering PSE increase.

Postsecondary experiences found to be important in the American literature include students' GPA, academic and social engagement, and other related measures. For example, using administrative records from Virginia Commonwealth University, Wetzel, O'Toole, and Peterson (1999) find that academic and social integration were the most significant determinants of persistence for the freshmen and sophomore students enrolled at that particular university (which is urban and public) over the years 1989-1992.

This said, and as alluded to above, although the relationship between such PSE indicators and PSE persistence is strong, it is difficult to identify the extent to which these relationships are causal. Perhaps being less engaged and obtaining lower grades is simply a normal step on the path for a student leaving PSE rather than an exogenous determinant of that outcome.

A national level Canadian study based on data from the Postsecondary Education Participation Survey (PEPS) shows that among students who left PSE prior to completion, half of them cited "lack of interest in their programs or PSE in general" as the reason for dropping out, whereas 29 percent cited "financial considerations" (Barr-Telford, Cartwright, Prasil and Shimmons, 2003). This implies that motivation plays a more important role than financial factors with respect to PSE persistence, though it is only a descriptive study, and does not probe into the determinants of these different reasons for leaving, such as the two models that have driven the American empirical literature.

Gilbert and Auger (1988) analyse first-year persistence rates for students who entered the University of Guelph in the fall of 1986 to find that financial factors played a more important role among students with lower socio-economic status (SES) than others. They also find that students from relatively *higher* SES backgrounds are *more* likely to *switch* to other institutions, while low SES students are more likely to stop-out (i.e., leave their studies and then return).

Grayson and Grayson (2003), in their review of the literature, conclude that the few studies that consider financial constraints as a reason for leaving a PSE program show only a weak effect.

Finally, in their recent work based on the YITS-B, Finnie and Qiu (2008) use multivariate modelling methods to find that college students with less highly educated parents and those coming from single parent families are more likely to drop out, but – perhaps surprisingly – neither of these relationships holds for their university counterparts. Female students leave less often from university, but college rates are about the same, and the university effect seems to be entirely related to high school grades (women get higher grades, and individuals, whether male or female, with higher high school grades are less likely to leave university). Those who came to the country as immigrants with their parents generally drop out less than others, while visible minorities have about the same rates as others. Those who started their studies when older are much more likely to drop out (if at university), and quit rates go down as students advance through their programs for university students but not college students. Grades are an important predictor of quit rates but are suspected to be at least partly endogenous to the dropping out process.

With this review of the existing literature in hand, we now proceed to the present analysis using the PSIS data.

Section 3 The analytical framework

In this section we describe the analytical framework used in the study, explain why this approach is used, and then set out the key definitions relating to persistence employed in the analysis: graduating, continuing at the initial institution, switching to a new program at a different institution, and leaving PSE. We also discuss the dynamic of returning to school among those who are observed to leave as well as those who continue with their studies after graduating from a PSE program.

3.1 The hazard approach

This paper uses what is variously called a hazard, survival, or duration analysis set-up (the terms are used interchangeably here). This approach is appropriate for studying persistence in PSE because it is meant to capture what are essentially time-related processes where there is a certain final outcome of interest (in this case graduation from a given PSE program), with the focus being on the time taken to reach that outcome (i.e., years to graduation), or alternatively, whether at each point in time a person achieves that outcome or otherwise remains on the path towards it (i.e., continues in their studies) or instead makes one of the transitions that takes them off that path (switching programs/institutions, leaving PSE).[10]

Analyses of this sort can be carried out in a modelling (regression-type) framework, or (as here) by using simpler hazard rate calculations.[11] Either way, the approach consists of calculating the relevant transition (or hazard) rates at each point in time following the individual student's entry into the state of being "at risk" within the PSE institution for making one those transitions.

In the present case, the analysis takes the form of estimating the probability that a student continues, graduates, switches, or leaves PSE on a year by year basis from their point of entry into a new program. More specifically, we begin to track students at the point they are observed to start a PSE program at a given institution, and measure at the end of each year whether at that time they are continuing their studies at the initial institution, have graduated, have switched to another program at a different institution, or have left PSE entirely.

Once one of the relevant transitions has been made the student is no longer generally followed since the process in question (i.e., what happens after a student starts a given PSE program) has been identified, and one of the relevant transitions has been made.[12] We do, however, subsequently follow those particular students who leave PSE to see how many return, and also look at how many of those who graduate then pursue further studies, as described below.

The reason we look at persistence at the institutional level rather than at the program level (Finnie and Qiu, 2008, adopt the latter perspective) is principally due to the difficulty of identifying program changes at a given institution within the PSIS data, as discussed further below. The terms "program change" and "change

of institution," along with other related terms, are used interchangeably in our discussions, and in all cases they refer to situations where a student moves from one institution to another, and thus starts a new program.

We use a similar methodological approach to look at two other processes, or dynamics. The first of these is the rate of returning to school among those who are observed to leave PSE after entering a program (i.e., the first process described above). How many return to PSE after being out one year, after two years, and so on. In this case, the state of "risk" – using the hazard analysis terminology – begins when the student leaves PSE (before graduating) and may therefore be in a situation to subsequently decide to return to school. Unfortunately, the number of years we can follow them through this dynamic within the scope of this particular study is quite limited, as discussed below.

Finally, we also use the same general approach to look at how many of those observed to graduate from a program continue their studies, either immediately or after a short break.

Rather than trying to track the vast number of different pathways that a person might take as they move through PSE for which any associated "decision tree" would be equally complex, this hazard model approach allows us to reduce the overall analysis to a few key well defined processes which lay at the heart of the general set of PSE persistence dynamics. We believe that this methodological approach, based on the transition-hazard analytical framework, is the only one well suited to exploiting the PSIS data to tell us what we want to know about PSE pathways.

3.2 The hazard approach and censoring

As indicated above, one of the principle reasons to adopt the hazard/duration/survival approach of the various processes to be investigated – continuing in a first program, returning to school after leaving PSE, starting a new program after graduating from a prior one – is that it is well suited to analysing the underlying dynamics which, taken together, capture the fundamental elements of persistence in PSE. In short, the inherently dynamic properties of the survival approach suit the PSE persistence processes in which we are interested in this study, and the PSIS data.

The second (and related) reason for adopting the survival approach is that the PSIS data result in many students' records being "censored". "Censoring" is the general term that is used to indicate a situation where we are able to follow the given process, or relevant "spells" (e.g., a student's trajectory in a given PSE program) for at least some individuals for only a certain length of time (one year, two years, three years). The spells are in this sense incomplete – or "censored" – i.e., we run out of data before any of the possible transitions are made.

For example, some students can be observed only for one year after entering PSE (those who enter in 2004/2005), whereas we are interested in the process beyond that point. Censoring is a general, inherent issue in duration studies of this type, precisely because they rely on longitudinal data which often follow individuals for uneven and generally limited lengths of time (as here).

The specific reason for censoring here, given the nature of the PSIS data, is that many of the "spells" that underlie the analysis representing students' pathways

after entering PSE are still in progress in the final year of the PSIS data (2004/2005). For example, in the first dynamic of what happens after students enter a new program, many individuals are still in that first program – having not graduated, not switched, not left PSE. And this may be after having been followed just one year, two years, or three years, depending on the calendar year (2001/2002 through 2004/2005) in which they started their program (as explained further below).

The standard solution (in hazard analyses in general as well as in this specific case) is to include spells in the analysis up to the point they are *censored* in this way. By doing so, all the information available in the data is used in the most efficient manner possible, and the sample used in the analysis is as general as possible, rather than being restricted to only those individuals who are observed over the longest period of time available (at the end of which many records would still be censored in any event).

It should be noted that another typical reason for censoring in longitudinal analyses is sample attrition. In survey data, this usually occurs when individuals who are initially included in the analysis (e.g., they are observed to start a PSE program) cannot be located, refuse to be interviewed, or otherwise do not have useable records in subsequent interviews in later years. Given the administrative nature of the PSIS data used here, however, this should not be a problem for this analysis, since the data should at least theoretically cover all persons in all years covered by the PSIS data. We return to this issue below.

3.3 Spell time and the dynamics in question

Consistent with the general hazard approach, the time frame of the analysis is spell time, not calendar time. So, although individuals enter PSE in different calendar years corresponding to the 2001/2002 through 2004/2005 reporting years currently covered in the PSIS, we define the beginning year for anybody starting a spell (i.e., when they are observed to enter PSE) as t_0, regardless of the calendar (reporting) year in which that spell started.

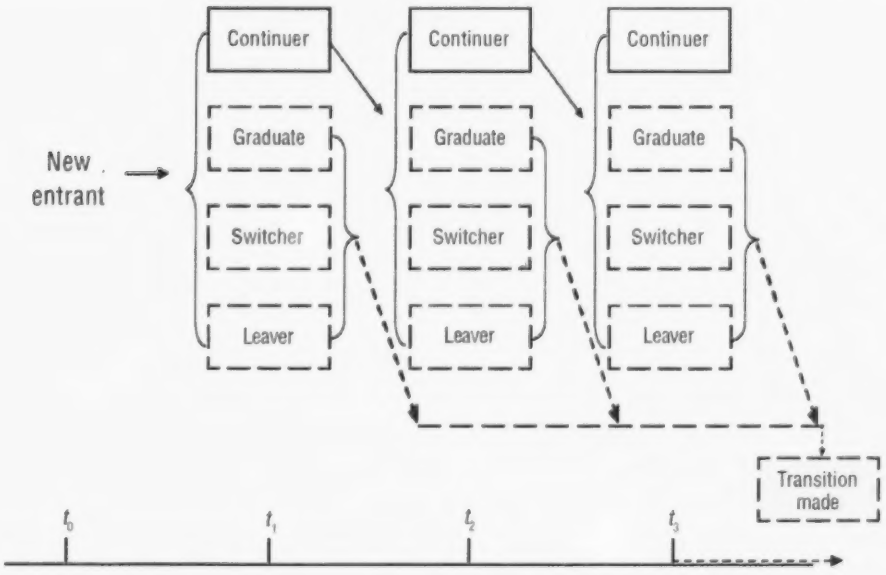
We then observe individuals after one year (t_1), after two years (t_2), and after three years (t_3), depending on when the spell started. Those in the 2001/2002 cohort (defined as all individuals who start their program in that year) are followed over the longest interval, through to 2004/2005 or three years in total. The 2002/2003 cohort can be followed for a period of two years, still out to 2004/2005 of course – but in this case only two years after entry. And the 2003/2004 cohort can be followed for just one year. The analysis is organized around these event-based intervals, and the data organised accordingly (i.e., by "event year" rather than calendar year).

Figure 1 below presents the framework graphically. Individuals start their PSE programs at time t_0. After one year, at time t_1, they are classified according to the four possible outcomes: "continuers", "graduates", "switchers", and "leavers". For "continuers", a solid arrow depicts their progression to the next time period t_2, since they did not, by definition, make any of the relevant transitions in the first year. For "graduates", "switchers", and "leavers", a dashed arrow indicates that these individuals are excluded from further analysis of the persistence dynamic because they have in fact made one of the relevant transitions during the year in question. Those who cannot be followed any further in the data because they are

censored, as described above, are simply deleted from the analysis as of the relevant spell year.

We *can*, however, follow those who leave PSE through any further PSE experiences by defining a new state, and a new process, which is what in fact we do for leavers. That is, a similar hazard set-up then characterises the re-entry process among leavers, for whom t_0 is now defined for this second kind of spell as of the point they leave PSE, and the possible outcomes, in any given year, are either that the individual re-enters PSE (the transition of interest), or does not. (Or again the spell may be censored, for the same reasons as discussed above.) Once this basic dynamic is established, we then probe the return-to-PSE process a little deeper to look at *where* they return – same or different institution, same or different level of study, etc.

Figure 1
Conceptual framework



Finally, we also look at graduates to see how many start new programs after finishing a prior one. This dynamic should probably be considered separate from the "core" persistence dynamics, however, and may perhaps best be defined as those students who continue in their studies towards graduation after starting a program, including those who return to school after dropping out.

Taken together, we believe these processes capture the key elements of the persistence dynamics, while also being analytically well defined and therefore suitable for analysis using the established hazard approach.

3.4 Tracking students and defining the transition states

The analysis requires us to track individuals over time and match their PSE enrolment status and related information from one year to the next in order to identify when students start a program. We then need to identify the subsequent pathways for this sample of PSE program starters as represented by our dynamics of interest (who continues, who graduates, who switches, and who leaves) on a year by year basis. And we need to do all this using an "event"-oriented time frame as opposed to a calendar year basis, which is how the PSIS data are organised.

Furthermore, the data must be organised in this way in a context where individuals can have multiple records in any given year, possibly at the same or different institution; they may have programs that overlap or run concurrently in a given year or across years, again possibly within a given institution or across different institutions; they may have programs that stop and then re-start; and more.

A further challenge is that although one of the fundamental – and extremely useful – characteristics of the PSIS is the uniformity of the data across institutions, different institutions do have somewhat different program structures and different reporting methods related to those different structures. For example, at some institutions, when individuals move into second or third year they declare a major (and not before), and are at this point considered to have started a new program, and this will be indicated in the person's record, while these very same dynamics will be considered as the continuation of the same program in other institutions.

The main point here is that the data are detailed and complex, reflecting the underlying reality of individuals' extremely varied PSE profiles, the differences in the classification and organisation of the information across different institutions, and the gathering of this information into a defined set of variables by Statistics Canada. This extremely complex set of pathways, and associated complexity in the PSIS dataset must, however, be organised to fit the analytical framework. This organisation is the first and, in many senses, the greatest challenge for the analysis.

The first step in the analysis was, therefore, to link a given individual's records longitudinally across all years. This was done by Statistics Canada, and more is said about this below.

Once this was done, the next step was to check, for each individual, all programs in all years for which they had a record in order to identify the point of entry into PSE for those observed to make such a start. From this point, we then tracked the person over time, checking all subsequent programs in order to identify the various dynamics and transitions of interest: continuing in a given program, graduation, a change to a different institution, and leaving PSE in the case of our first dynamic of interest.

In addition, precise dates had to be attached to all program information in each year: when the person started the program, when they stop attending (if that happened), the date of any graduation that occurred, etc. This was required in order to track the person's outcomes on a precise year by year basis: When exactly did they start PSE? What was their situation one year – i.e., precisely 12 months (give or take a month) – after starting their program? And for those who continued in their studies after that first year, what were they doing after two years (24 months), after three years (36 months)?[13]

And recall that in doing all this, we essentially strip away the calendar/reporting year basis of the data – which is of course how the data are organised in PSIS – and use instead a "spell interval" time frame, where the relevant concept stems from the starting date of an individual's program, as described above.

This obviously requires complex programming, even if the end result is conceptually fairly simple – as is often the case with analyses undertaken with longitudinal data.

Based on this treatment of the data, we define the following outcomes. First, ***graduation*** is captured by a variable in the PSIS that explicitly marks this event. In our treatment, a student was counted as having graduated in the year in question if they did so at any point up to the relevant anniversary date (or the following month).

A student is, alternatively, defined as a **continuer** in a given year if he or she had not graduated but was identified as still being enrolled at the original institution at the end of the reporting year in question.

Given the difficulty of accurately identifying program changes within a given institution in a consistent manner in the PSIS, either within a given faculty (say, from History to English), or across faculties (e.g., from Humanities to Engineering), we take the more tractable route of defining "continuing" with respect to the *institution* rather than a given program. That is, if a person was enrolled in the same *institution* one, two, or three years after starting, they were classified as a continuer at that point.[14]

Thirdly, a ***switcher*** is defined as someone who left the initial institution (without graduating) and was enrolled at a new one as of the year-end dates used to parameterise the analyse.[15]

Finally, a ***leaver*** is defined as someone who either had no record in the relevant year, thus – given the comprehensive nature of the PSIS file – implying no enrolment in an Atlantic Canada PSE institution, or had a PSIS record in the year in question but was not enrolled as of the relevant one year anniversary date (again give or take a month).

Note that those who leave Atlantic Canada but stay in PSE are classified as leavers, rather than switchers, but an analysis of the YITS data for Atlantic Canada suggests that switching rates would only be about 5 percent higher and leaving rates commensurately lower, were inter-regional switchers to be taken into account (i.e., about 95 percent of all Atlantic Canada switchers appear to go to another institution in that region). What is, therefore, potentially an important limitation in the data does not, in practice, appear to be very significant.

Section 4 The data: the PSIS and the samples employed

In this section, the general characteristics of the PSIS data are described, the samples created for the analysis are defined, and descriptive statistics of these samples presented. Readers who are less concerned with such details may skim the section, although they should at least gain a basic understanding of the three different samples employed ("Sample 1", and the two variants of "Sample 2"). To this end, the organisation of the section into detailed sub-sections should allow readers to go to the parts they are more interested in, although those who read the entire section will likely wind up having a better understanding of the analysis and its various nuances.

4.1 The PSIS and the Longitudinal "L-PSIS"

The unique opportunities for measuring persistence using the PSIS

The PSIS dataset has been constructed by Statistics Canada from administrative data provided to it by PSE institutions across the country in a standardised format.[16] For this study, the data cover (public) PSE institutions (and students) in Atlantic Canada, with the PSIS having been put on a longitudinal footing for this region in order to facilitate an analysis of PSE pathways.

This regional impetus is, in turn, rooted in the on-going general cooperation on matters related to PSE among the Atlantic provinces, and their decision to undertake this particular project jointly in order to obtain as complete a view of PSE persistence pathways as possible, as well as to share the costs of the required data development and analysis and other related practical and analytical reasons.[17]

The focus on Atlantic Canada also, however, corresponds to the nature of the PSIS data: coverage is currently essentially complete in Atlantic Canada, which is not the case elsewhere in the country. As previously discussed in the literature review, such coverage allows for a much more complete, and more representative, analysis of persistence patterns than is possible with data based only on a single institution – or even a collection of single institutions which do not actually take account of switching among themselves. Individual institutions also typically lack the sample sizes required to carry out a statistically credible and detailed analysis of the kind presented here. And finally, having the broader data set allows for the direct inter-provincial comparisons that have been carried out.

In summary, the PSIS affords the opportunity to analyse persistence in a more complete and effective fashion than has been possible before – in this case for all of Atlantic Canada.[18]

The Longitudinal PSIS, or "L-PSIS"

The basic "cross-sectional PSIS" includes one record for each program a person was in for each year of data (2001/2002 through 2004/2005), "year" in this case being a reporting year, and reflecting the organisation of the institutions' administration data. These are essentially the raw data Statistics Canada receives from the institutions.

As discussed earlier in the section on the analytical framework, an individual will have multiple records in a given year if they were in more than one program in that year (in the same institution or at different institutions), while individuals will have records in more than one year in cases where they were in a given program beyond a single (reporting) year or were in different programs in different years.

The basic PSIS is thus comprised of a set of individual "person-year-program" records which are not linked together for given individuals – either across programs in a given year, or over time. For this project, however, individuals were linked in both these respects. In essence, every person-year-program record had an individual identifier attached.

It is this "L-PSIS" file (for "Longitudinal PSIS" to differentiate it from the underlying cross-sectional files, although this is not an official name that has been given to the file) with its personal identifiers that allows us to match individuals' records across programs in a given year, and over time. With this information, we are able to arrange the data in the manner required to identify program starts and subsequent PSE dynamics and otherwise carry out the analysis in the manner discussed above.

The linkage process whereby the individual identifiers were attached to construct the "L-PSIS" is actually relatively simple, since PSIS records generally include enough information to identify individuals and match them across their different records.

Eighty-five percent of the linkages were "deterministic", defined as cases where the matches were made within the same institution based on institution code, student number, SIN, birth date, name and gender.[19]

The remaining 15 percent of the linkages, were "probabilistic", based on the "GRLS" ("Generalised Record Linkage System) employed by Statistics Canada for datasets required such matching. In this system, weights are assigned to each variable used in the matching process (name, sex, birth year, etc.), different types of links are assigned based on that information, and thresholds are used to determine the final decision on a case by case basis.

By this method, when the total weight of a pair of records is greater than the upper threshold (i.e., most of the information corresponds), it is classified as a definite link. When the total weight is below the lower threshold (less information corresponds), it is classified as a rejected link. Cases with a total weight between the upper and lower thresholds are considered as possible links. Possible links require manual resolution to determine whether they are accepted or rejected. Particular care was taken for cases possibly involving twins or mother/daughter, father/son cases where some of the basic information (e.g., names, birth dates.) might be identical. All linked pairs were then checked for inconsistencies.

Further tests were carried out to see if other links may have been missed. This essentially consisted of relaxing the thresholds and checking any additional matches made with the lower thresholds. Very few additional matches were, however, made in this way, suggesting that the methods employed were indeed picking up most of the actual "correct" linkages in the data. This is a particularly important step for our analysis because the absence of a record in a given year for a given individual is interpreted as indicating the person was not in PSE in that year, which is our principal means of defining PSE leavers.

In addition, Statistics Canada further investigated records for those we identified as PSE leavers in our analysis based on the lack of any record in a subsequent period (thus implying the person was not in school) to again see if any record matches may have been missed, but again there was no evidence that this was the case, giving us further confidence in the data.

Statistics Canada generally regards the record linkage exercise to have been highly successful, and we have no reason to doubt this assessment based on our own work with the data as well as meetings with Statistics Canada personnel who explained the record linkage procedures and showed us various computer programs and data files related to that process.

4.2 Sample selection criteria

General Selection Rules

To begin, we selected into our working samples only those records which indicated the individual started a new PSE program over the 2001/2002 through 2004/2005 period covered by the data. The reasons for restricting the analysis to individuals starting new programs are two-fold. First, it is well known based on other research (and confirmed in our analysis here) that persistence rates vary with the duration of a spell, or otherwise put, depending on what year of studies the person is in (although "year of studies" is itself often difficult to define).

Thus, if we do not take spell year into account, we will obtain a set of average transition rates that are not necessarily very meaningful: how many individuals who are in PSE in a given year then graduate, continue, switch, or leave in the next year *regardless of what year they are in*. Identifying individuals at the beginning of their spells and following them on a year by year basis from that point therefore represents the desired set-up from an analytical perspective.

Secondly, by including only new PSE program beginners, we obtain a representative sample with well defined properties: those individuals who started a PSE program during the 2001/2002 through 2004/2005 period covered by the data.[20]

Sample 1

We also, however, put other restrictions on the data. First, we included only those individuals who started regular PSE programs, and excluded those taking individual courses at college or university that were not part of a program normally intended to lead to a completed diploma or degree. This is the usual definition of PSE used, for example, in calculating PSE enrolment numbers or in determining eligibility for student financial assistance.

The selected programs could, however, be at any of the following levels: college, bachelor's degree, master's degree, Ph.D., or a first professional degree. The analysis carried out with the college and bachelor's degree samples is, however, more extensive than that for the other levels. This is partly because the larger sample sizes make the college and undergraduate university level analysis more statistically reliable, and allow for a much more detailed analysis. But it is also because the dynamics at the college and undergraduate university levels are more varied, more interesting, and probably more relevant to policy-related questions, even if only for the sheer numbers involved.

Having stated these general principles, the nature of the PSIS data sometimes makes it difficult to identify when students actually started a new program as opposed to when they were continuing in a program that had started earlier, since in some cases "a new program" is only the beginning of another phase of what is essentially an on-going program (as discussed above).

Furthermore, the data on start dates and related variables can represent different things at different institutions, meaning that any attempt to differentiate new program starts from the continuation of a single program would require institution-specific treatment, and thus very complex programming. This might be a worthwhile exercise, but it is one that lay beyond the scope of this analysis.

Finally, in addition to such data problems, there probably remains an inherent ambiguity in the underlying *reality* of what constitutes the start of "a new program", especially in cases where a person has already been in school and is continuing their studies perhaps with a bit of a shift (e.g., a change of major or a move from one faculty to another).

The first general rule we adopted for our ***Sample 1***, therefore, is that to be considered as a new program and thus included in the analysis, the information had to indicate that the program did indeed start in the year in question *and* there was no other program going on simultaneously when it started. In the case of such overlapping, it was felt there simply would have been too much uncertainty as to which program had started when and how the two programs were related, if at all.

Appendix 1 at the end of the paper shows some typical illustrative cases in point, and the sample inclusion rules that would be applied to these. Note that a program was selected into the sample in cases where there were two records in a given year *if* the second program started after the first one ended, and thus had a "clean" start.

In all cases – in the trivial cases where there was just one program in a given year as well in the more complicated cases where there were two programs – it was the *first* "clean" program in a given year (i.e., with a well defined start date at a point in time when there were no other programs in progress) that was selected into the sample.[21]

Sample 2

A second set of conditions is added to create our preferred **Sample 2**. First, like Sample 1, the person must have had a "clean" program start in a given year as indicated by its start date and the information on any other concurrent programs, as described above. But we also require (unlike Sample 1) that the person was not enrolled in any other program earlier in the year *regardless* of the earlier program's

start and end dates, *nor* were they in any program in the *previous* year. These conditions were imposed in order to further ensure that the program being selected was indeed a new start, and not the continuation of an earlier program with the potential complications discussed above.

Finally, we also restrict the sample to programs that started in August or September. While individuals do of course start programs at other times through the year, it was felt, based on our inspection of the data, that at least a substantial proportion of these might be individuals who were coming back to school after a previous start.[22]

This resulted in a set of very clean program starts which we think represents the best sample for this analysis, although for completeness we do present many findings for Sample 1 as well.[23]

Note that Sample 2 requires using the first year of data, 2001/2002, as a precondition (or "checking") year for spells beginning in 2002/2003. As a result, no new spells starting in that first year ("cohort 2001") enter this sample. (Otherwise put, there is no checking year for new programs starting in 2001/2002 since that is the first year of data).

In order to further tighten the analysis, we also restricted **Sample 2** in certain places to **individuals aged 17 to 20 at the beginning of their program**. This was done in order to generate an even more well-defined, "clean" sample, meant to capture individuals just starting out in PSE directly or soon after completing their high school studies, and to leave the analysis as unconfounded as possible by any previous – but inconsistently identified – PSE experiences. It may also be that this group is the one in which many government policy makers are most interested. This younger group also lends itself to comparisons with the YITS data, some of which are shown below. But we appreciate that older students are also of interest to policy-makers and postsecondary institutions, and we therefore present at least some results for the other samples as well. The reader may thus decide which results they prefer with full information as to what the different sets of findings represent.

4.3 Sample characteristics

Table 1 shows the characteristics of those included in the three different samples: Sample 1, Sample 2 all ages, and Sample 2 with the 17 to 20 age restriction. The decrease in sample sizes from Sample 1 to Sample 2 represents two effects: the tighter restrictions being imposed and the elimination of all spells beginning in 2001/2002 (as described above).

The large number of starts for cohort 2001/2002 relative to 2002/2003 and 2003/2004 represents an indication of how inclusive Sample 1 is, which we suspect is picking up many on-going programs that are simply observed for the first time in this first year of the data. This pattern further reinforces our general preference for Sample 2 over Sample 1.

Also note the number of observations lost with the additional age restriction imposed on Sample 2, especially at the college level. This reinforces the importance of offering different perspectives of the processes in question as represented by the two variants of the sample.

The differences between the total sample size numbers in Table 1 and the combined sizes of the bachelor's and college groups represent the other educational levels that figure in the analysis: those who started masters, Ph.D., and first professional degree programs. But as previously mentioned these groups figure in a more limited fashion in our analysis. Their precise numbers are shown below.

Other sample characteristics are also shown in Table 1. The samples are, overall, decidedly more female than male. This imbalance is driven in particular by the bachelor level numbers, where women make up about 60 percent of the student population, whereas the proportions are similar but tilted in the opposite direction at the college level.

We see more details on the age distribution in the next panel of the table, where again the different spreads at the college and university levels are revealed. A full 27 percent of the college students in Sample 2 are above age 26, and another 21 percent are age 21 to 25, leaving the more restrictive sample to include just the 51.5 percent of new entrants under this age.

By province, we see that students at Nova Scotia institutions comprise 42 to 47 percent of the samples, these shares holding roughly equally at the college and university levels. New Brunswick is in the 27 percentage range at the college level in Sample 2 (more in Sample 1), but higher, at 34 to 38 percent, at the bachelor's level. For Newfoundland and Labrador, the opposite pattern holds: a relatively greater representation at the college level than university (17 to 20 percent and 11 to 12 percent, respectively, in the two versions of Sample 2). Prince Edward Island comprises something under 10 percent of each of the samples, including greater shares in Sample 2 than Sample 1, which would be consistent with their students in the PSIS data generally representing more "fresh starts" than in the other jurisdictions.[24] We note in this regard that the province indicated here is that of the PSE institution attended, not the origin of the student. The different relative sizes of the college and bachelors sectors by province are interesting and itself worthy of study, but for this study we simply take those patterns as given.

Section 5 Empirical findings

We turn now to the results of our empirical analysis of PSE pathways and persistence in PSE based on the PSIS ("L-PSIS") data. We first look at the main transition ("hazard") rates related to graduating, continuing, switching and leaving, as well as the associated cumulative rates to get a longer term perspective of where students are as of each year after starting their programs. We then look at switchers in more detail to see where exactly they go. We then follow those who come back after leaving to see how many do so, and where they come back. The following subsection then shifts gears a bit, stepping out of these more basic persistence dynamics, to look at how many individuals who graduate from a program go on to further PSE studies, and again drill into these patterns in some depth (where, what level, etc.)

5.1 Transition and cumulative transition rates: persistence in PSE

Transition rates

Tables 2 and 3 show the basic transition rates for samples 1 and 2. The latter include three variants: students of all ages, students who started their programs at age 17 to 20, and the same age group where we consider a broader list of programs to which individuals may be classified as switchers (instead of leavers).

The calculations show the percentage of students – first after one year ("Year 1") – who had graduated from their programs, were continuing in their programs (i.e., were still enrolled at the same institution) or, alternatively, had switched institutions or had left PSE. (See above for further discussions of the set-up of the data and analytical approach, the construction of the samples, the precise definitions of these transitions, and other methodological issues.)

The numbers for "Year 2" then represent the transitions in that year, again as measured in terms of the student's situation as of the relevant "anniversary" date, *of those students who had not made a transition in the first year*, which is the defining mark of hazard rate calculations such as these (as explained earlier). Hence a student may have graduated by the end of Year 2, may be still enrolled at the same institution, or may have switched institutions or left PSE. The exercise is then repeated for the third year in the case of Sample 1, but not Sample 2 (for which no Year 3 records are observed due to the construction of the sample, as described above).

Comparing the results for Sample 1 and Sample 2, the data show that continuing rates are generally higher for Sample 2, especially the age-restricted (17 to 20) variant of that sample, while graduation rates are lower, pointing to the different natures of the two samples. In our opinion, Sample 2 "behaves" a little better in terms of capturing the record of individuals from the point they truly enter a new program, rather than in some cases "starting" a program that is really the continuation of one already in progress (which may characterise some of the records in Sample 1, as discussed earlier).

See, for example, the slightly lower graduation rates among bachelor's students in the first years with Sample 2. The results seem "cleanest" of all for the younger group (Sample 2 – age 17 to 20), which is deemed to be the best at picking up individuals as they are truly starting a new program (probably in most cases their first), rather than continuing on in a program that has already been started in one fashion or another. For these reasons, we focus the bulk of our remarks throughout the rest of the paper on the Sample 2 results, with the greatest emphasis on the age restricted version, although in most cases we at least show the results for the broader age group as well.

Focusing on Table 3 (Sample 2), and starting at the university level, the numbers show that the first year "dropout rate" from the point of view of individual institutions (i.e., switchers plus leavers) is 21.7 percent and 20.2 percent in the two top panels (i.e., those of all ages and those who started their programs at age 17 to 20), close to the average first-year dropout rate of 24 percent for 13 Canadian universities reported by Wong (1994).

But some of these "leavers" are in fact *switchers*: 4.6 and 5.1 percent, in absolute terms, respectively for the two groups, or 21.2 and 25.2 percent in relative terms when compared to all those who leave a given institution (i.e., as compared to the switcher and leaver totals noted above). We thus see that ignoring moves to other institutions substantially overstates the numbers who leave PSE. "True" leaving rates (i.e., from PSE entirely) are left at 17.1 and 15.1 percent in the two samples.[25]

Switching and leaving rates are considerably lower in the second year as compared to the first, as expected, but remain substantial. For example, in the age 17 to 20 sample, leaving rates decline from 15.1 percent to 11.7 percent, while switching rates go from 5.1 percent to 4.2 percent.

Returning to Sample 1, which has rates out to the third year, the data suggest that both leaving and switching rates then approximately halve from the Year 2 levels at that point. This is probably indicative of what happens in Sample 2 as well, but of course we cannot say for sure if this would be the case in the absence of the actual data.[26]

Expanding the list of programs to which university students are considered "switchers" (rather than leavers) to include non-PSE programs at PSE institutions (e.g., short courses, language training, and so on) gives the results reported in the bottom panel of Table 3 (again using the younger variant of Sample 2). The effect is to reduce the leaving rate somewhat further, to 13.8 percent, and increase the continuing rate and switching rates commensurately.

From this perspective, the "drop out rate" in the first year goes from 20.2 percent when both leavers and switchers are added together (i.e., the "institution's perspective") and a narrower range of programs are included for switchers (i.e., the second panel of results), to 13.8 percent when only true leavers are considered (i.e., switchers are accounted for) and those switchers include students in non-PSE programs at PSE institutions.

This represents a reduction in the estimated drop-out rate of 6.4 percentage points in absolute terms, or 32 percent in relative terms. The PSIS data thus give a substantially different perspective of the number of PSE leavers relative to what would be estimated with institution-specific data. (See below on the numbers who

return to their studies after leaving, which is another important consideration in the calculation of any "global" persistence rate.)

Also notable is that leaving rates are considerably higher among college students than bachelor's students: 22.6 percent (college) versus 15.1 percent (bachelor's) in the first year in the middle panel in Table 3, 19.7 versus 11.7 percent in the second year. This pattern likely reflects college students' generally more marginal attachment to PSE – both in terms of entry, and subsequent persistence patterns.[27]

What is also different among the two groups is that switching is almost negligible for college students, whereas the numbers are substantial for bachelor's students. These are interesting findings unto themselves, and also suggest that relative drop-out rates for college and bachelor's students based on institution-specific data will tend to understate how many more college students leave PSE relative to bachelor's students – an important finding in any overall assessment of the two systems. We will return to these issues later, when we drill further into where these switchers go.

Graduation rates are, naturally, low for the bachelor's group in these first years after starting their programs, but substantial for college students due to their typically shorter programs.

Cumulative transition rates

Tables 4 and 5 show cumulative transition rates by year. These take into account those who switch or leave (or graduate) in the earlier year(s), *as well as* those who first continue in their programs but then make one of these transitions in a subsequent year. The calculations thus essentially add the rates together across years to show how many are still continuing in their studies and how many have made any of the relevant transitions by the relevant point in time (after one year, after two years, after three years).[28] We again focus on Sample 2.

The first year rates are (by construction) the same as those already seen, while the second year cumulative transition rates are of course higher as the transitions from the first two years are added together. For Sample 2 (Table 5), we observe two-year cumulative leaving rates among bachelor's students of 27 percent (all ages) or 24.5 percent (17 to 20), with another 7 to 8 percent having switched programs. Taking leavers and switchers together, a total of 34.4 and 32.9 percent (all ages versus 17 to 20) have left the institutions where they started their programs – somewhere around three-quarters of these leaving PSE entirely, the other quarter leaving to study elsewhere.

The cumulative leaving rates for college students are 31.5 percent (all ages) and 33 percent (17 to 20), while switching rates remain very low.

In each case, leaving rates are a little lower, and switching rates in particular are a little higher when a broader range of programs are considered as switches (the final panel of the table).

Students in Master's, First Professional Degree and Ph.D., programs

Transition rates are shown for students in master's, first professional degree, and Ph.D. programs in Tables 6 (the hazard rates) and 7 (the cumulative rates based on those hazard rates). These are shown only for Sample 1, because we do not want to

restrict the analysis to those who had not taken a previous program, as was our intention in Sample 2. The reason is that we want to include those who started their programs after being in (finishing) another, while the on-going program problem that Sample 2 was largely meant to address would likely be less of a problem with this group.

Not surprisingly, leaving rates are much lower at these levels of study than among bachelor's and college students: in the first year they are 9.5, 5.5 and 6.3 percent at the three levels, respectively (Table 6). Switching is almost non-existent.

One interesting finding is the non-linear pattern for Ph.D. students, with leaving rates dropping from year 1 to year 2, but then rising again in year 3, presumably reflecting, among other influences, the effects of comprehensive exams, which normally take place after two years.

Year 3 cumulative leaving rates (Table 7) are, for the three levels, 19 percent (master's), 8.7 percent (first professional degree), and 12.1 percent (Ph.D.) With the low switching rates that characterise these groups, these rates should be – in contrast to the bachelor's and college results – comparable to what would be obtained with institution-specific data if all institutions in Atlantic Canada could be included in the calculations.

Transition rates by individual characteristics and province

Tables 8 and 9 show transition rates by sex, age, province and cohort for the two main variants of Sample 2 (all ages, age 17 to 20). Tables 10 and 11 show the associated cumulative rates. The patterns are similar for the two samples, varying principally only by level (as would be expected). For convenience, we focus our comments on the younger samples (Table 9 and 11).

Men leave at considerably higher rates than woman at the university level: 17 versus 13.8 percent in the first year for the 17 to 20 group, 14.4 versus 10 in the second year, with a cumulative difference of 28.4 percent versus 21.9 by the end of year 2. "What's the matter with men?" is thus seen to be a relevant question with respect to persistence rates as well as access rates – i.e., going on as well as getting into PSE.

The implications of these findings are important. Not only do men enter university at substantially lower rates than women (e.g., Finnie, Lascelles, Laporte (2004), Finnie and Mueller (2008), Frenette and Zeman (2007)), they are also considerably less likely to continue on in their studies. Gender differences in final graduation rates – i.e., the numbers actually obtaining degrees – are, therefore, skewed even further than the access rates we have previously been looking to would indicate.

Women's *switching* rates are, conversely, a bit higher than men's. This means that when we put leaving *and* switching rates together, which (again) is the "quit rate" from the perspective of individual institutions, the true gender differences in persistence in PSE (i.e., after allowing for switchers) are understated. The benefit of being able to include switchers in our analysis, as is possible with the PSIS data, is again clear. The reasons for these different gender patterns represent an interesting topic for further research.

The patterns by sex are more mixed at the college level: a leaving rate of 22.1 percent for men versus a higher 24.1 percent for women in Year 1, but 21.5 percent for men and a *lower* 17.9 percent for women in Year 2. As a result, their cumulative rates by the end of Year 2 are almost identical (33.1 and 33.6 percent respectively). Here, the benefits of the PSIS data come in being able to precisely identify quit rates at different points in individuals' programs, with the sample sizes available providing more accurate estimates than would be the case with institution-specific data.

Leaving rates rise substantially with age (measured as of the year in which the person started their program) for bachelor's students (Tables 8 and 10 only since Tables 9 and 11 cover just the 17 to 20 group). Again the cumulative results show these effects most dramatically. After two years, the leaving rates are 24.5, 35.5 and 39.2 percent, respectively, for those aged 17 to 20, 21 to 25, and above 26 at the start of their studies (Table 10).

Conversely, bachelor's students' *switching* rates *decline* with age, and in an even more dramatic fashion than the increases in leaving rates in relative terms (although not in terms of the absolute percentage point changes, since switching rates are generally much lower than leaving rates). Cumulative switching rates, by the end of Year 2, are 8.4, 3.7, and 2.2 percent for the three different age groups.

One way to interpret these two sets of results is that older students seem to know better what they want to study, and where (and therefore switch programs less), but are less likely to keep to the task (their higher quit rates). Of course increased family and other responsibilities among older students might figure importantly in these dynamics: for example, reducing mobility, while putting different pressures on the challenges of being able to stay in school. This might be a topic for further research using the PSIS.

For college students, the leaving pattern by age are actually slightly reversed with rates being slightly lower for older students (switching rates remain negligible). Enrolling in college when older thus appears to be a more well-defined path than it is for bachelor's students not only in terms of the greater numbers involved (as seen earlier), but also in terms of the associated persistence patterns.

By province, the differences are perhaps surprisingly small given the varying nature of the different PSE systems in terms of the number of institutions, their locations, tuition fee structures, and more. At the university level, first year leaving rates range from 15.2 percent to 19.1 percent in the all-ages sample, and from 12.9 to 17.5 percent for the more restricted 17 to 20 group. But within these ranges, Newfoundland and Labrador, Prince Edward Island, and New Brunswick are relatively tightly clustered, within a couple or so points of each other, while only Nova Scotia is a bit of an outlier, with lower rates (both samples).

Again the cumulative rates shown in Table 11 emphasize the patterns: leaving rates vary between 25.9 and 27.1 percent for the three "clustered" provinces by the end of year 2, while they are 21.4 percent for Nova Scotia.

In this context, one cannot help but note that Nova Scotia has the highest tuition rates among the Atlantic provinces, and while these simple correlations hardly demonstrate any causal relationship between costs and persistence, the patterns are interesting: higher tuition levels do not necessarily translate into higher leaving rates.

And neither are these lower rates due to any obvious "composition effects", whereby a province with lower access rates to start might be expected to have higher persistence rates, on the grounds that those who enter the system are a more select group. Instead, access rates are in fact *higher* in Nova Scotia than any of the other Atlantic provinces (and indeed the highest of any jurisdiction in Canada): Nova Scotia is associated with both higher access *and* higher persistence rates.[29]

Of course Nova Scotia is different from the other provinces in other ways as well, including their greater numbers of out-of-province (and out-of-region) students[30] who are likely to be of generally higher ability, more motivated, and different in other ways that might be associated with, or contribute to, higher persistence rates. It would be necessary to measure provincial differences in persistence rates only after taking these factors into account before we could say anything very definitive about how rates truly compare by province, and – perhaps the more interesting question – why, as well as to draw any conclusions that could impact on future policy.[31]

Perhaps as surprisingly, *switching* rates do not vary a great deal by province either. This despite, for example, the fabled ability to "walk across the street to a different institution" in Halifax, and the generally greater number, and wider distribution, of campuses in that province as compared to elsewhere. However, here again more in-depth study would be required before we could say anything very meaningful about these patterns.

At the college level, first year transition rates are also similar across jurisdictions, except for Prince Edward Island whose rates are lower. But sample size becomes a factor here, as is the case for the second year results more generally, so we do not attach too much significance to that particular pattern. For the rest of the college results, many differences are observed, although they are often of a type which causes the patterns to even out over time (i.e., see the cumulative rates in year 2) and otherwise perhaps point to institutional differences such as those relating to specific program length (e.g., see some of the continuing-graduation patterns across years).

An additional set of provincial level results is included in Appendix 2, but the caveats just offered with respect to the overall differences by province apply here as well (probably even more so), so these extra results are left to interested readers to peruse, with caution advised in terms of their interpretation. That said, the differences are mainly in the levels rather than the patterns by the other variables, and therefore point to no obviously interesting stories to add (e.g., the stories by gender, age, and so on are relevant consistent across provinces).

Of course following up on the provincial patterns would make for an interesting line of future research. Suffice it to say that these direct comparisons, facilitated by the PSIS, are in fact new and unique, and thus represent the potential stepping off point to other further studies which probe more deeply into the provincial patterns.

Finally, the small differences by cohort (the last set of results in each case) at both the college and university level point to solid selection procedures for this sample. If, for example, rates had been found to be significantly different for the two cohorts, we might have suspected we were picking up different kinds of students

in the two years, which might in turn indicate that our sample selection procedures were not as robust as would be wished for. But this is not the case.

Transition rates at the level of individual institutions

Building on the provincial level results presented just above, Appendix 3 includes a set of persistence results by individual institution (again only at the college and bachelor's level). These are interesting if only because this is the first time such direct comparisons have been possible – again showing the new perspectives of persistence rates afforded by the PSIS.

But the caveats and cautions just offered with respect to the provincial level results need to be repeated – and emphasized even more strongly – with these institutional results. This is (again) because there are many possible reasons for these patterns, and comparing the raw rates essentially reduces this study to a "report card" exercise that is lacking in any real meaning – except to perhaps prompt us to want stakeholders to understand the patterns better, which would in fact be a very interesting extension of the current analysis. Including the results is thus perhaps worthwhile for this alone: to show that such comparisons are possible and to open the door to further work focussed on these patterns.

Why the extreme caution on these institutional differences? Because they may stem from any of the following causes (and perhaps others):

- Differences in program structures and/or (possibly associated) differences in the organisation of the underlying data or reporting methods across institutions which generate differences in the data that do not reflect any real differences in underlying behaviour. And this even though the PSIS project aims for as much standardisation as possible, and we have tried to generate numbers that are consistent: see for example the discussions of our sample selection rules, the reasons for our treatment of persistence at the institutional level rather than the program level above, and other discussions of our data and methods above. Despite all of these efforts, some "apples and oranges" problems may still remain.
- Differences in student characteristics. For example, some institutions might have lower (or higher) persistence rates because they have more (or fewer) inherently "low persistence" (or "high persistence") students than other institutions.[32]
- Differences in institutional rules that make it relatively easier to stay or leave, to leave and come back, or to follow other pathways.
- Differences in provincial-level rules or other possible provincial (policy-related) factors such as student financial aid which affect the institutions in a given province.
- Differences in external conditions, such as the local unemployment rate, faced by students at a given institution, which may affect the relative benefits, or ease, of going to or staying in PSE.

Identifying and taking account of these factors and any others would be essential before any meaningful interpretation could be made of the institutional results. Not too much should, therefore, be made of the raw numbers on their own, any more than not too much should be made of death rates or other measures of "success" across different hospitals, of student performance measures across K-12 schools (again, see the recent work by David Johnson in this regard), and so on.

But the results do point to what is possible with the PSIS data precisely because Atlantic Canada institutions have participated in the data collection exercise underlying the PSIS project, and these data could be the means of in fact identifying other sets of factors that affect persistence rates, some with possibly interesting policy implications (e.g., change policies at given institutions, the rules regarding transfers across institutions or level of study, etc.)

5.2 Switchers and leavers who return to PSE

Where do switchers go?

Table 12 presents data which affords a closer look at switchers: how many remain at the same level of studies (college, university) but change institution, separating out how may remain in the same province and how many go to a different one, and how many change their level of studies, again either while remaining in the original province or going to a different one. (Keep in mind the Atlantic coverage of the data, meaning that only moves within the region are recorded.)

Among bachelor's students, and focusing still on the 17 to 20 age group (patterns are roughly the same for the broader sample), the data show that switching rates are 5.1 and 4.2 percent, respectively, in years 1 and 2 (as previously seen in Table 3). Of these, in the first year, exactly two-thirds (66.7 percent) stay at the same level of studies in their new programs, and among this group, a somewhat greater share remain in the same province as compared to the number who leave (1.9 percent versus 1.5 percent in actual percentages).

Of the remaining one-third of first-year switchers who change their level of studies from university to college, most stay in their original province (1.4 percent), while the remainder (just .3 percent overall) change both level of study and the province in which they pursue those studies.

Overall, then, just 1.8 percent of all first year bachelor's students (age 17 to 20 – but it is about the same proportion for older students) move to study in a different (Atlantic) province at either the same level of study or at the college level by the beginning of their second year, and in the second year the number is just 1.3 percent. In short, inter-provincial mobility among bachelor's students in Atlantic Canada appears to be quite low.[33,34]

There are, as seen previously, not many switchers at the college level: for example, just 1.3 percent and .8 percent in the first two years among the age 17 to 20 group, and a mere .9 percent for those of all ages. Interestingly, though, almost all of these change their level of study (i.e., they switch to university) while remaining in the same province.

With all the talk of switching between college and university, the actual numbers involved therefore appear to be very small. Whether they could, or should, be greater, is a topic for further investigation.

How many return to PSE after leaving?

The next dynamic we analyse is the rate of returning to PSE after leaving. To do this, we take those identified as leavers in the first part of the analysis and follow them to see how many return to PSE after that. We are, however, able to follow these individuals for just one year with our preferred Sample 2, because the earliest

samples of leavers enter PSE in the second year of data (the 2002/2003 reporting year), leave in the third year of data (2003/2004), and can therefore be observed post-leaving only in the 2004/2005 data.

The results, shown in Tables 13 and 14, are nevertheless interesting. In that first year, 25 percent of all bachelor's leavers of the age 17 to 20 group return to PSE (20 percent in the case of the all-age sample). Overall leaving rates are, therefore, substantially overstated when this group of "leaver-returners" is not taken into account. Otherwise put, "permanent" leavers are considerably fewer in number than the number of "temporary leavers" would indicate – the well-known, but little quantified, "stop-out" phenomenon.[35]

Of those who return, about half (11.9 percent of the 25 percent total) go back to the same institution (and same level – i.e., they stay at university). Another 5.8 percent stay at the same level (i.e., university) but change institution, these about evenly split between those who stay in-province (2.8 percent) and those who move to another province within Atlantic Canada (3 percent). A final 7.4 percent change their level of study (i.e., they switch to college), with most of these (5.7 percent) staying in-province, the remaining 1.7 percent changing both level and province[36].

Among college leavers, a much smaller proportion of leavers subsequently return to their studies: 11.5 percent (age 17 to 20) and 10.4 (all ages) percent in the first year we observe here. Of these, most return to the same institution (and level), 8.5 and 8.4 percent, respectively. Of the others, the greatest number change level (i.e., switch to university – 2 and 1.4 percent), almost all in the same province. Another small group goes to a different institution at the same level, almost all in another province (0.9 and 0.6 percent).[37].

Appendix 2 reports a similar set of findings at the provincial level, but again no particularly interesting stories emerge, and the other caveats about making such comparisons without taking other factors into account apply.

5.3 Graduates who go on to further studies

How many PSE graduates go on to further studies?

We now exploit the PSIS data in a different way, by identifying those who graduate from a PSE program over the period covered by the YITS data and then seeing how many of these individuals start a new program in the following years either directly or after staying out a year or two (or three). We also look at the level of these new programs to get a fuller picture of these dynamics.

The samples used in this part of the analysis are not restricted to those who were included in the analysis of *entrants*, as focussed upon thus far, or otherwise subjected to the same sorts of selection criteria (including those related to age), since there is no need to do so from an analytical perspective, and doing so would greatly restrict the representativeness of the analysis.

To be included in this part of the analysis, individuals must only have been identified as having graduated from a regular PSE program in the 2001/2002, 2002/2003, or 2003/2004 reporting years of the PSIS. They are then tracked for as long as they could be after that – i.e., from the year of graduation through 2004/2005 (at

which point the spells are right-censored in the same manner as in the transition analysis presented above). Individuals of all ages are included.

Given the comprehensive coverage of the PSIS data, we would expect to identify all individuals who enrolled in a new PSE program in Atlantic Canada over this interval. The strength of the PSIS data in this respect over institution-specific data is obvious, since returning to PSE will in a great number of cases include movements to different institutions.[38]

The analysis will, however, once again not capture those who pursue their studies outside of Atlantic Canada after finishing a first program. The results are thus of potential interest, especially for PSE administrators and policy makers – those within Atlantic Canada in particular – but lack completeness in terms of tracking individuals' subsequent PSE profiles. They effectively represent *minimum* re-enrolment rates as captured by the subset of students who stay within Atlantic Canada.

Table 15 shows the relevant hazard rates. These are calculated in the same manner as the persistence rates presented above, and represent the numbers of graduates observed to start a new PSE program one, two and three years after finishing their initial diplomas, in the latter two cases conditional on not having already made such a start (or transition) by the year in question and otherwise not being right-censored. The associated cumulative rates are shown in Table 16, and should be interpreted as the proportion of graduates who had started a new program by the indicated year (as calculated from the hazard rates shown in Table 15).

Two sets of numbers are reported. In the first, overlapping programs are allowed and included in the calculations (i.e., the new program may have begun before the completion date of the program initially graduated from). In the second, such overlaps are not permitted (i.e., the new program must have started after the graduation date of the first) and individuals who made such a transition are deleted from the calculations at that point. The reason for this second treatment is again the general ambiguity of interpreting overlapping programs in the PSIS and in real life circumstances. Fortunately, the results are roughly similar in the two sets of findings. For convenience, we focus on the more comprehensive sample.

The rates of continuing in PSE are relatively high, even though new programs taken out of the province are not counted. By three years after graduating (Table 16), more than one third (36.5 percent) of bachelor's students had enrolled in another PSE program, while 30.3 percent of college graduates had done so. Interestingly, the great majority of these (at both levels) enrolled in their new programs in the first year following graduation (see the hazard rates in Table 15 or the increments by year in Table 16). "Gap years" do not appear to be particularly common at the PSE level – although it is certainly a path some follow.

At what level do graduates take their new programs?

Table 12 rounds out this part of the analysis of graduates by reporting the level of the new programs identified in the preceding tables. Among bachelor's graduates, and again focusing on the broader samples, we observe that a full third (34.8 percent) of those who return to PSE do so in non-regular PSE programs which will normally not lead to a diploma (category 98).

These include a wide array of program types, including language courses, other specific skill development courses, and others of the like, as well as pure interest courses. In short, a substantial number of bachelor's graduates appear to return to their studies to top up their skills or otherwise pursue secondary "avocations" in one way or another outside a regular PSE program.

Almost another third (29.2 percent) are in what might be considered conventional or "progressive" PSE career paths (codes 10 through 24): a master's degree, a Ph.D., or a first professional program (medicine, law, etc.) Interestingly, though, another 26.2 percent are enrolled in a new bachelor's program, and an additional 4.6 percent in a university diploma or certificate program below bachelor's, making for a total of 60 percent who remain at university at some level.

Just 4 percent of these bachelor's graduates start a new (regular) PSE program at the college level (codes 05 through 07), which seems like a surprisingly low number given all the attention paid to this path in the popular press. A final 1.2 percent are in programs listed as "below PSE" (code 01), which represent programs for which the usual college entrance requirements (i.e., having graduated from grade 12) don't apply. These include language skills and PSE upgrading/preparation, some apprenticeship programs, and other development and upgrading programs.[39]

Studying the details of these new programs represent a worthwhile extension of the present analysis. What exactly are these new programs? How do they relate to the individual's previous studies? How long do these second programs take? What is the persistence rate within *these* programs? What do graduates do *after* these *second* programs?

Among college graduates, 39.5 percent are in new regular PSE college programs, 20.3 percent are at the bachelor's level and a trivial 0.2 percent are at a higher university level. Another 17.8 percent are in "below PSE" programs (still in PSE institutions) and 22.1 percent are in non-regular programs at PSE institutions. These are interesting and potentially important pathways that probably merit further analysis.

5.4 Comparisons with the YITS and other possible checks of the PSIS

It is always good to check the findings of any empirical analysis with other data and other studies in order to assess the quality of each underlying data source (no source is ever perfect), the nature of the analysis, the general nature of the findings, and whatever else lends itself to such comparisons. This is especially true in the case of a new data set, a new analysis, or both, which is essentially the situation here.

To this end, we have carried out a set of checks between the PSIS findings reported here and those found with the YITS-B dataset. The YITS-B, as mentioned earlier, is a major Statistics Canada dataset which is comprised of a longitudinal sample of a single cohort of youth aged 18 to 20 who were first interviewed in 2000 and again in three follow-up telephone surveys in 2002, 2004, and 2006 (a final interview was carried out in 2008). The YITS-B is well-suited to the analysis of persistence in PSE, and has been used by the authors to conduct a study that is closely comparable to the one reported here based on the PSIS (Finnie and Qiu

(2008)). For the desired checks, we re-did some of the basic parts of our YITS analysis to make it as directly comparable as possible to our PSIS analysis (restricting the data to Atlantic Canada, adjusting some of our definitions, and so on).

A detailed description of these checks and some related findings are reported in Appendix 4. The conclusion of this exercise is that while some differences are found, the results are close enough (in some cases remarkably so) to give us further assurance regarding the quality of the PSIS data, as well as the nature of the analytical framework adopted. Other checks that could be performed, including those based on linking the PSIS and YITS with the longitudinal tax-based LAD file, are also suggested.

Section 6 Conclusion

This paper has presented an analysis of persistence in postsecondary education in Atlantic Canada based on the Postsecondary Student Information System ("PSIS") database that has been developed at Statistics Canada using administrative files provided to them by PSE institutions in the region. Given the unique nature of this database, the analysis carried out is original in a number of important ways.

First, the PSIS data – and this analysis based on it – covers all PSE students in Atlantic Canada in public PSE institutions at the college and university levels, and therefore represents the overall record for all PSE students in the region. The analysis is generally broken down by level of study, with the focus on college and bachelor's level students, while master's, Ph.D., and first professional degree students are also covered in terms of the basic persistence dynamics. Patterns are broken down by sex, age (as of the start of the program), province, and year of study (the latter throughout the analysis) and some interesting patterns are revealed.

Second, the longitudinal version of the PSIS that has been constructed for this analysis (the "L-PSIS") allows us to conduct a full and proper analysis of persistence, which is an inherently dynamic (and complex) process. The approach used here consists of identifying individuals as they enter a new PSE program and then following them over time on a year by year basis. Individuals are then classified as either graduates, continuers, switchers or leavers on a year by year (and cumulative) basis. The full coverage of the PSIS is key to capturing all these dynamics, including separating switchers from true leavers from PSE, something which can not be done with institution-specific data alone. The full coverage of the Atlantic region also means we capture those who move to a program at an institution in a different province (as long as it is in Atlantic Canada) which is not possible with province-specific datasets, and to break the patterns down and make comparisons along the provincial dimension.

Third, the longitudinal aspect also allows us to identify not only "first transitions" (graduates, continuers, switchers and leavers) but also to see where "switchers" (defined as those who move to a new PSE program in a different institution) go in terms of their level (college versus university) and place of study (in the original province or a different one).

Fourth, again thanks to the longitudinal element and full coverage of the PSIS, we are also able to identify how many leavers return to PSE, and (again) where they do so with respect to level and place – although due to the relatively short time period currently spanned by the data (four years), we can only identify those who return within two years of leaving.

Fifth, we are able to identify PSE graduates and see how many continue with their studies at the PSE level either immediately, or after a break of one or two years. And once again we look at the level (college or university) and place (province)

of those further studies. The limitation of the data to Atlantic Canada, however, means that we are able to capture (as with the other dynamics covered in the analysis) only those who continue (or return to) their studies in this same region, which obviously limits the analysis to some degree.

All this represents unique and original evidence on persistence in PSE which should be of interest not only to those concerned with student pathways in Atlantic Canada, but also elsewhere in the country, and even at the international level, at least partly because our findings might help place existing evidence in a new perspective. The analysis may be of interest to administrators, policy makers, academics, students themselves, and others.

We would suggest three principal directions for future work, although many more could be identified. First would be to carry out the additional data checks proposed in the paper (see Appendix 4 for details), including linkages with other longitudinal datasets (the YITS and LAD) which would i) help verify the quality of the PSIS (as well as the other datasets with respect to their tracking of PSE profiles), and ii) in some cases (particularly with the LAD) allow further research of a very interesting type based on the linked files. This could include incorporating the family background information available in the LAD into our analysis of persistence rates, and then following individuals in the LAD after they left PSE.

The second extension we suggest is to adopt a modelling-econometric approach to analysing the dynamics in question. This would include applying the multi-nomial logit model used in related work on the same questions carried out by the authors using the YITS database. In this way, more variables could be brought into the analysis, and the various factors that affect persistence could be looked at simultaneously. The model could include both individual characteristics (sex, age, and so on) and institution and program characteristics, perhaps going as far as to incorporate the remarkably detailed program- and course-level information available in the PSIS.

The third line of research would be to attempt to identify within-institution program changers and to add this dynamic to the analysis. This would likely require working closely with institutional representatives so that the information available in the PSIS is correctly interpreted in terms of identifying such changes. Given the differences across institutions in this respect, such an analysis might be best restricted to a limited number of institutions, at least to start.

Many other possible research projects could surely be identified with this rich and unique dataset, including not only those that continue in the persistence topic, but also others related to different PSE issues. We hope this paper has provided a useful first step which has provided interesting and useful new evidence on persistence in PSE in Atlantic Canada, has offered a helpful assessment of the strengths of the main strengths and limitations of the PSIS data, and has pointed the way to new work that could be undertaken.

Table 1
Sample characteristics

	Sample 1[1, 2]			Sample 2[2, 3], all ages			Sample 2[2, 3], age 17 to 20		
	Total	Bachelor's	College	Total	Bachelor's	College	Total	Bachelor's	College
	percent	percent	percent	percent	percent	percent	percent	percent	percent
Number of observations	**109,815**	**56,895**	**36,164**	**45,719**	**22,483**	**16,787**	**28,350**	**18,101**	**8,637**
Gender									
Male	**45.8**	41.4	53.9	**45.7**	40.4	53.5	**46.0**	40.0	58.1
Female	**53.8**	58.5	45.2	**53.8**	59.5	45.4	**53.4**	60.0	40.4
Unknown	**0.4**	0.1	0.9	**0.5**	0.1	1.2	**0.5**	0.0	1.6
Age									
17 to 20	**53.7**	70.2	44.9	**62.0**	80.5	51.5	**100.0**	100.0	100.0
21 to 25	**20.8**	18.3	23.0	**16.2**	10.8	20.9	**0.0**	0.0	0.0
26 and over	**24.6**	11.2	30.2	**21.2**	8.4	26.6	**0.0**	0.0	0.0
Unknown	**0.8**	0.3	1.9	**0.6**	0.3	1.1	**0.0**	0.0	0.0
Postsecondary education province									
Newfoundland and Labrador	**15.5**	13.4	16.9	**15.2**	12.2	17.3	**15.4**	11.3	19.8
Prince Edward Island	**6.1**	5.1	9.0	**7.3**	6.2	10.2	**7.8**	6.5	11.4
Nova Scotia	**46.6**	47.5	42.6	**46.3**	44.9	45.1	**42.7**	43.9	41.8
New Brunswick	**31.8**	33.9	31.6	**31.3**	36.7	27.3	**34.1**	38.3	27.0
Cohort									
Cohort 2001	**46.1**	46.1	46.7	**0.0**	0.0	0.0	**0.0**	0.0	0.0
Cohort 2002	**27.9**	26.9	28.8	**51.4**	50.6	52.0	**49.8**	49.4	50.6
Cohort 2003	**26.0**	27.0	24.5	**48.6**	49.4	48.0	**50.2**	50.6	49.4

0 true zero or a value rounded to zero

1. Sample 1 includes all calendar years of entry into a new program, with fewer restrictions and includes students of all ages.
2. Sample 2 includes entry in 2002 with the restriction that the student had no Postsecondary Education programs in 2001, and entry in 2003 with the restriction that the student had no Postsecondary Education programs in 2001 or 2002. The age restrictions apply where indicated.
3. See the text for other sample selection criteria.

Source: *Longitudinal Postsecondary Student Information System.*

Table 2
Hazard transition rates by program year, sample 1

	Observations	Continuer	Graduate	Switcher	Leaver
	number	percent	percent	percent	percent
Bachelor's					
Year 1	56,895	74.8	2.9	3.4	18.9
Year 2	30,789	77.1	7.8	2.5	12.6
Year 3	14,567	68.2	22.9	1.1	7.7
College					
Year 1	36,164	47.3	29.4	0.8	22.5
Year 2	12,872	23.6	55.1	0.7	20.6
Year 3	2,027	29.2	46.2	1.1	23.6

Note: Only "continuers" are carried forward to the following year, while "graduates", "switchers" and "leavers", having made one of the relevant transitions, are not followed further. See the text for further details regarding the calculations. This treatment applies to the other hazard transition rates shown in other tables.

Source: *Longitudinal Postsecondary Student Information System.*

Table 3

Hazard transition rates by program year, sample 2

	Observations	Continuer	Graduate	Switcher	Leaver
	number	percent	percent	percent	percent
			All ages		
Bachelor's					
Year 1	22,483	77.4	0.9	4.6	17.1
Year 2	8,752	81.1	2.4	3.6	12.8
College					
Year 1	16,787	48.9	28.0	0.9	22.2
Year 2	4,356	20.7	59.6	0.8	18.9
			Age 17 to 20		
Bachelor's					
Year 1	18,101	79.8	0.1	5.1	15.1
Year 2	7,139	83.3	0.8	4.2	11.7
College					
Year 1	8,637	52.6	23.5	1.3	22.6
Year 2	2,350	25.0	54.6	0.8	19.7
			Age 17 to 20, expanding programs in the "transition-to" situation		
Bachelor's					
Year 1	18,101	80.5	0.1	5.6	13.8
Year 2	7,179	83.0	0.8	4.9	11.3
College					
Year 1	8,637	53.4	23.5	1.7	21.4
Year 2	2,390	26.9	54.2	1.1	17.7

Note: Only "continuers" are carried forward to the following year, while "graduates", "switchers" and "leavers", having made one of the relevant transitions, are not followed further. See the text for further details regarding the calculations. This treatment applies to the other hazard transition rates shown in other tables.

Source: *Longitudinal Postsecondary Student Information System.*

Table 4

Cumulative transition rates by program year, sample 1

	Observations	Continuer	Graduate	Switcher	Leaver
	number	percent	percent	percent	percent
Bachelor's					
Year 1	56,895	74.8	2.9	3.4	18.9
Year 2	56,895	57.7	8.7	5.3	28.4
Year 3	56,895	39.4	21.9	5.9	32.8
College					
Year 1	36,164	47.3	29.4	0.8	22.5
Year 2	36,164	11.2	55.5	1.1	32.2
Year 3	36,164	3.3	60.6	1.2	34.9

Note: Calculated from the annual transition (hazard) rates shown in Table 2.

Source: *Longitudinal Postsecondary Student Information System.*

Table 5

Cumulative transition rates by program year, sample 2

	Observations	Continuer	Graduate	Switcher	Leaver
	number	percent	percent	percent	percent
			All ages		
Bachelor's					
Year 1	22,483	77.4	0.9	4.6	17.1
Year 2	22,483	62.8	2.8	7.4	27.0
College					
Year 1	16,787	48.9	28.0	0.9	22.2
Year 2	16,787	10.1	57.1	1.3	31.5
			Age 17 to 20		
Bachelor's					
Year 1	18,101	79.8	0.1	5.1	15.1
Year 2	18,101	66.4	0.7	8.4	24.5
College					
Year 1	8,637	52.6	23.5	1.3	22.6
Year 2	8,637	13.1	52.2	1.7	33.0
			Age 17 to 20, expanding programs in the "transition-to" situation		
Bachelor's					
Year 1	18,101	80.5	0.1	5.6	13.8
Year 2	18,101	66.8	0.7	9.6	22.9
College					
Year 1	8,637	53.4	23.5	1.7	21.4
Year 2	8,637	14.4	52.5	2.3	30.9

Note: Calculated from the annual transition (hazard) rates shown in Table 3.

Source: *Longitudinal Postsecondary Student Information System.*

Table 6

Hazard transition rates by program year for Master's, first professional degrees and Ph.D., sample 1

	Observations	Continuer	Graduate	Switcher	Leaver
	number	percent	percent	percent	percent
Master's degree					
Year 1	7,470	87.1	3.1	0.2	9.5
Year 2	4,818	62.1	30.5	0.2	7.2
Year 3	1,726	53.7	40.4	0.0	5.9
First professional degree					
Year 1	1,794	93.8	0.4	0.3	5.5
Year 2	1,377	50.0	46.8	0.4	2.8
Year 3	456	47.8	51.1	0.0	1.1
Ph.D.					
Year 1	491	93.5	0.2	0.0	6.3
Year 2	326	97.5	0.9	0.3	1.2
Year 3	198	86.4	8.6	0.0	5.1

0 true zero or a value rounded to zero

Note: Only "continuers" are carried forward to the following year, while "graduates", "switchers" and "leavers", having made one of the relevant transitions, are not followed further. See the text for further details regarding the calculations. This treatment applies to the other hazard transition rates shown in other tables.

Source: *Longitudinal Postsecondary Student Information System.*

Table 7

Cumulative transition rates by program year for Master's, first professional Degree and Ph.D., sample 1

	Observations	Continuer	Graduate	Switcher	Leaver
	number	percent	percent	percent	percent
Master's degree					
Year 1	7,470	87.1	3.1	0.2	9.5
Year 2	7,470	54.1	29.7	0.5	15.8
Year 3	7,470	29.0	51.5	0.5	19.0
First professional degree					
Year 1	1,794	93.8	0.4	0.3	5.5
Year 2	1,794	46.9	44.3	0.6	8.2
Year 3	1,794	22.4	68.3	0.6	8.7
Ph.D.					
Year 1	491	93.5	0.2	0.0	6.3
Year 2	491	91.2	1.1	0.3	7.5
Year 3	491	78.8	8.9	0.3	12.1

0 true zero or a value rounded to zero

Note: Calculated from the annual transition (hazard) rates shown in Table 6.

Source: *Longitudinal Postsecondary Student Information System.*

Table 8

Hazard transition rates by individual characteristics, sample 2, all ages

	Year 1					Year 2				
	Observations	Continuer	Graduate	Switcher	Leaver	Observations	Continuer	Graduate	Switcher	Leaver
	number	percent	percent	percent	percent	number	percent	percent	percent	percent
Bachelor's										
Gender										
Male	9,082	75.7	1.0	4.2	19.1	3,429	78.4	3.0	3.2	15.4
Female	13,383	78.6	0.9	4.8	15.7	5,321	83.0	2.0	3.9	11.1
Age at enrolment										
17 to 20	18,101	79.8	0.1	5.1	15.1	7,139	83.3	0.8	4.2	11.7
21 to 25	2,426	69.3	4.0	2.4	24.2	951	72.0	9.9	1.9	16.2
26 and over	1,888	66.6	5.0	1.9	26.6	655	71.5	9.2	0.5	18.9
Postsecondary education province										
Newfoundland and Labrador	2,751	75.0	3.1	2.8	19.1	935	76.8	3.0	3.2	17.0
Prince Edward Island	1,388	76.5	0.1	5.5	17.9	493	81.5	1.0	3.9	13.6
Nova Scotia	10,103	79.4	0.6	4.9	15.2	3,867	82.0	3.0	3.3	11.7
New Brunswick	8,241	76.0	0.8	4.6	18.6	3,457	81.3	1.9	4.1	12.7
Cohort										
Cohort 2002	11,372	77.0	1.1	4.7	17.2	8,752	81.1	2.4	3.6	12.8
Cohort 2003	11,111	77.9	0.7	4.4	17.0	0	...	...	...	...
College										
Gender										
Male	8,977	47.9	28.8	0.8	22.5	2,289	26.0	52.6	0.6	20.8
Female	7,615	49.5	27.3	0.9	22.2	1,986	15.4	66.6	1.0	17.1
Age at enrolment										
17 to 20	8,637	52.6	23.5	1.3	22.6	2,350	25.0	54.6	0.8	19.7
21 to 25	3,504	47.1	30.9	0.7	21.3	942	17.4	63.5	0.5	18.6
26 and over	4,457	43.9	34.2	0.3	21.6	1,027	13.7	67.6	0.8	17.9
Postsecondary education province										
Newfoundland and Labrador	2,910	70.1	5.8	0.7	23.4	1,192	37.4	42.1	0.8	19.6
Prince Edward Island	1,715	59.7	25.8	0.6	13.8	478	7.3	84.3	0.0	8.4
Nova Scotia	7,572	43.8	31.6	1.0	23.7	1,847	15.0	60.4	1.0	23.6
New Brunswick	4,590	39.9	36.9	1.0	22.2	839	17.2	68.5	0.5	13.8
Cohort										
Cohort 2002	8,722	49.9	26.7	0.9	22.4	4,356	20.7	59.6	0.8	18.9
Cohort 2003	8,065	47.8	29.4	0.8	22.0	0	...	...	...	...

... not applicable

0 true zero or a value rounded to zero

Note: Only "continuers" are carried forward to the following year, while "graduates", "switchers" and "leavers", having made one of the relevant transitions, are not followed further. See the text for further details regarding the calculations. This treatment applies to the other hazard transition rates shown in other tables.

Source: *Longitudinal Postsecondary Student Information System.*

Table 9

Hazard transition rates by individual characteristics, sample 2, age 17 to 20

	Year 1					Year 2				
	Observations	Continuer	Graduate	Switcher	Leaver	Observations	Continuer	Graduate	Switcher	Leaver
	number	percent	percent	percent	percent	number	percent	percent	percent	percent
Bachelor's										
Gender										
Male	7,236	78.3	0.1	4.6	17.0	2,756	80.7	1.3	3.6	14.4
Female	10,856	80.8	0.1	5.4	13.8	4,382	84.9	0.5	4.5	10.0
Postsecondary education province										
Newfoundland and Labrador	2,040	81.4	0.1	3.3	15.1	717	82.3	0.6	3.9	13.2
Prince Edward Island	1,178	78.7	0.0	5.2	16.1	417	83.7	0.0	3.4	12.9
Nova Scotia	7,948	81.6	0.0	5.5	12.9	3,035	84.6	1.1	3.8	10.5
New Brunswick	6,935	77.3	0.1	5.1	17.5	2,970	82.1	0.7	4.7	12.5
Cohort										
Cohort 2002	8,949	79.8	0.1	5.3	14.8	7,139	83.3	0.8	4.2	11.7
Cohort 2003	9,152	79.8	0.0	4.9	15.4	0	...	...	...	...
College										
Gender										
Male	5,017	51.3	25.4	1.1	22.1	1,324	30.7	47.2	0.7	21.5
Female	3,486	52.9	21.5	1.5	24.1	955	18.7	62.3	1.0	17.9
Postsecondary education province										
Newfoundland and Labrador	1,710	72.8	3.1	0.7	23.4	740	42.8	34.7	1.4	21.1
Prince Edward Island	985	68.6	17.2	0.8	13.4	309	8.1	83.8	0.0	8.1
Nova Scotia	3,607	46.4	26.7	1.4	25.5	869	18.5	56.2	0.8	24.5
New Brunswick	2,335	40.6	36.2	1.7	21.4	432	19.4	64.4	0.5	15.7
Cohort										
Cohort 2002	4,373	53.7	21.7	1.3	23.2	2,350	25.0	54.6	0.8	19.7
Cohort 2003	4,264	51.4	25.3	1.3	22.0	0	...	...	...	...

... not applicable

0 true value or a value rounded to zero

Note: Only "continuers" are carried forward to the following year, while "graduates", "switchers" and "leavers", having made one of the relevant transitions, are not followed further. See the text for further details regarding the calculations. This treatment applies to the other hazard transition rates shown in other tables.

Source: *Longitudinal Postsecondary Student Information System.*

Table 10

Cumulative transition rates by individual characteristics, sample 2, all ages

	Year 1					Year 2				
	Observations	Continuer	Graduate	Switcher	Leaver	Observations	Continuer	Graduate	Switcher	Leaver
	number	percent	percent	percent	percent	number	percent	percent	percent	percent
Bachelor's										
Gender										
Male	9,082	75.7	1.0	4.2	19.1	9,082	59.3	3.3	6.6	30.8
Female	13,383	78.6	0.9	4.8	15.7	13,383	65.2	2.5	7.9	24.4
Age at enrolment										
17 to 20	18,101	79.8	0.1	5.1	15.1	18,101	66.4	0.7	8.4	24.5
21 to 25	2,426	69.3	4.0	2.4	24.2	2,426	49.9	10.9	3.7	35.5
26 and over	1,888	66.6	5.0	1.9	26.6	1,888	47.6	11.1	2.2	39.2
Postsecondary education province										
Newfoundland and Labrador	2,751	75.0	3.1	2.8	19.1	2,751	57.6	5.3	5.2	31.9
Prince Edward Island	1,388	76.5	0.1	5.5	17.9	1,388	62.4	0.9	8.4	28.3
Nova Scotia	10,103	79.4	0.6	4.9	15.2	10,103	65.1	2.9	7.5	24.5
New Brunswick	8,241	76.0	0.8	4.6	18.6	8,241	61.8	2.2	7.8	28.3
Cohort										
Cohort 2002	11,372	77.0	1.1	4.7	17.2	11,372	62.5	3.0	7.5	27.0
Cohort 2003	11,111	77.9	0.7	4.4	17.0	0	...	...	...	...
College										
Gender										
Male	8,977	47.9	28.8	0.8	22.5	8,977	12.4	54.0	1.1	32.4
Female	7,615	49.5	27.3	0.9	22.2	7,615	7.6	60.3	1.4	30.7
Age at enrolment										
17 to 20	8,637	52.6	23.5	1.3	22.6	8,637	13.1	52.2	1.7	33.0
21 to 25	3,504	47.1	30.9	0.7	21.3	3,504	8.2	60.8	0.9	30.1
26 and over	4,457	43.9	34.2	0.3	21.6	4,457	6.0	63.9	0.6	29.5
Postsecondary education province										
Newfoundland and Labrador	2,910	70.1	5.8	0.7	23.4	2,910	26.2	35.3	1.3	37.2
Prince Edward Island	1,715	59.7	25.8	0.6	13.8	1,715	4.4	76.2	0.6	18.8
Nova Scotia	7,572	43.8	31.6	1.0	23.7	7,572	6.6	58.0	1.4	34.0
New Brunswick	4,590	39.9	36.9	1.0	22.2	4,590	6.9	64.3	1.2	27.7
Cohort										
Cohort 2002	8,722	49.9	26.7	0.9	22.4	8,722	10.3	56.5	1.3	31.9
Cohort 2003	8,065	47.8	29.4	0.8	22.0	0	...	...	...	...

... not applicable

0 true zero or a value rounded to zero

Note: Calculated from the annual transition (hazard) rates shown in Table 8.

Source: *Longitudinal Postsecondary Student Information System.*

Table 11

Cumulative transition rates by individual characteristics, sample 2, age 17 to 20

	Year 1					Year 2				
	Observations	Continuer	Graduate	Switcher	Leaver	Observations	Continuer	Graduate	Switcher	Leaver
	number	percent	percent	percent	percent	number	percent	percent	percent	percent
Bachelor's										
Gender										
Male	7,236	78.3	0.1	4.6	17.0	7,236	63.2	1.1	7.4	28.4
Female	10,856	80.8	0.1	5.4	13.8	10,856	68.6	0.5	9.0	21.9
Postsecondary education province										
Newfoundland and Labrador	2,040	81.4	0.1	3.3	15.1	2,040	67.0	0.6	6.5	25.9
Prince Edward Island	1,178	78.7	0.0	5.2	16.1	1,178	65.9	0.0	7.8	26.3
Nova Scotia	7,948	81.6	0.0	5.5	12.9	7,948	69.0	0.9	8.6	21.4
New Brunswick	6,935	77.3	0.1	5.1	17.5	6,935	63.5	0.6	8.7	27.1
Cohort										
Cohort 2002	8,949	79.8	0.1	5.3	14.8	8,949	66.4	0.8	8.6	24.2
Cohort 2003	9,152	79.8	0.0	4.9	15.4	0	...	...	...	...
College										
Gender										
Male	5,017	51.3	25.4	1.1	22.1	5,017	15.7	49.6	1.5	33.1
Female	3,486	52.9	21.5	1.5	24.1	3,486	9.9	54.5	2.1	33.6
Postsecondary education province										
Newfoundland and Labrador	1,710	72.8	3.1	0.7	23.4	1,710	31.2	28.4	1.7	38.7
Prince Edward Island	985	68.6	17.2	0.8	13.4	985	5.6	74.7	0.8	19.0
Nova Scotia	3,607	46.4	26.7	1.4	25.5	3,607	8.6	52.7	1.8	36.9
New Brunswick	2,335	40.6	36.2	1.7	21.4	2,335	7.9	62.4	1.9	27.8
Cohort										
Cohort 2002	4,373	53.7	21.7	1.3	23.2	4,373	13.4	51.0	1.7	33.8
Cohort 2003	4,264	51.4	25.3	1.3	22.0	0	...	...	...	...

... not applicable

0 true zero or a value rounded to zero

Note: Calculated from the annual transition (hazard) rates shown in Table 9.

Source: *Longitudinal Postsecondary Student Information System.*

Table 12

Details on switchers, changes in level and province, sample 2

	Total			Same level				Different level			
	Observations	All switchers	All switchers	Same province	Same province	Different province	Different province	Same province	Same province	Different province	Different province
	number	percent	distribution	percent	distribution	percent	distribution	percent	distribution	percent	distribution
All ages											
Bachelor's											
Year 1	22,483	4.6	100.0	1.7	37.2	1.4	29.4	1.3	28.3	0.2	5.2
Year 2	8,752	3.6	100.0	1.2	32.7	0.9	26.1	1.3	36.2	0.2	5.0
College											
Year 1	16,787	0.9	100.0	0.0	5.4	0.1	10.7	0.7	75.2	0.1	8.7
Year 2	4,356	0.8	100.0	0.0	3.0	0.0	6.1	0.6	78.8	0.1	12.1
Age 17 to 20											
Bachelor's											
Year 1	18,101	5.1	100.0	1.9	36.7	1.5	30.0	1.4	28.1	0.3	5.2
Year 2	7,139	4.2	100.0	1.3	32.0	1.1	25.3	1.6	37.4	0.2	5.4
College											
Year 1	8,637	1.3	100.0	0.1	7.1	0.1	8.0	1.0	75.0	0.1	9.8
Year 2	2,350	0.8	100.0	0.0	5.3	0.0	5.3	0.6	73.7	0.1	15.8

0 true zero or a value rounded to zero

Note: Only "continuers" are carried forward to the following year, while "graduates", "switchers" and "leavers", having made one of the relevant transitions, are not followed further. See the text for further details regarding the calculations. This treatment applies to the other hazard transition rates shown in other tables.

Source: *Longitudinal Postsecondary Student Information System.*

Table 13

Hazard rates of returning to postsecondary education among leavers, sample 2, same institution

	Total			Same institution			
	Observations	All returners	All All returners	Same level	Same level	Different level	Different level
	number	percent	distribution	percent	distribution	percent	distribution
All ages							
Bachelor's							
Year 1	1,956	20.0	100.0	10.0	49.7	0.1	1.3
College							
Year 1	1,955	10.4	100.0	8.4	80.4	0.1	0.5
Age 17 to 20							
Bachelor's							
Year 1	1,325	25.0	100.0	11.9	47.4	0.0	0.0
College							
Year 1	1,016	11.5	100.0	8.5	73.5	0.1	0.9

0 true zero or a value rounded to zero

Note: These returning rates are calculated for those identified as postsecondary leavers in the preceding part of the analysis.

Source: *Longitudinal Postsecondary Student Information System.*

Table 14

Hazard rates of returning to postsecondary education among leavers, sample 2, different institution

	Total			Different institution							
				Same level				Different level			
	Observations	All returners	All returners	Same province	Same province	Different province	Different province	Same province	Same province	Different province	Different province
	number	percent	distribution	percent	distribution	percent	distribution	percent	distribution	percent	distribution
						All ages					
Bachelor's											
Year 1	1,956	20.0	100.0	2.2	11.0	2.2	11.0	4.3	21.4	1.3	6.6
College											
Year 1	1,955	10.4	100.0	0.1	0.5	0.6	5.4	1.3	12.3	0.1	1.0
						Age 17 to 20					
Bachelor's											
Year 1	1,325	25.0	100.0	2.8	11.2	3.0	12.1	5.7	22.7	1.7	6.6
College											
Year 1	1,016	11.5	100.0	0.1	0.9	0.9	7.7	1.9	16.2	0.1	0.9

Note: These returning rates are calculated for those identified as postsecondary education leavers in the preceding part of the analysis.
Source: *Longitudinal Postsecondary Student Information System.*

Table 15

Hazard rates of starting a new program among graduates

	Bachelor's		College	
	Observations		Observations	
	number	percent	number	percent
Allowing for overlapping between the graduate program and the new program				
Year 1	28,088	26.6	24,489	18.1
Year 2	12,579	8.4	13,514	9.1
Year 3	3,998	5.5	6,267	6.4
No overlapping between the graduate program and the new program				
Year 1	24,481	23.0	22,846	15.6
Year 2	11,631	8.3	12,996	9.2
Year 3	3,817	5.6	6,077	6.4

Notes: In the first panel of results, students may have started the new program before graduation from the first. In the second panel of results, the new program must have started after graduation from the first. See the text for further details.

The graduates followed here are those identified as successful program finishers at some point in the data. They are then followed to see how many start another postsecondary education program. The general principles underlying the calculation of these hazard transition rates are the same as those described in the notes to Table 2 and the text for the case of transitions after finishing one program and thus "at risk" of starting another. See the text for further details.

Source: *Longitudinal Postsecondary Student Information System.*

Table 16
Cumulative rates of starting a new program among graduates

	Bachelor's		College	
	Observations		Observations	
	number	percent	number	percent
Allowing for overlapping between the graduate program and the new program				
Year 1	28,088	26.6	24,489	18.1
Year 2	28,088	32.8	24,489	25.6
Year 3	28,088	36.5	24,489	30.3
No overlapping between the graduate program and the new program				
Year 1	24,481	23.0	22,846	15.6
Year 2	24,481	29.4	22,846	23.4
Year 3	24,481	33.3	22,846	28.3

Note: Calculated from the hazard rates shown in Table 15.
Source: *Longitudinal Postsecondary Student Information System.*

Table 17
The new programs started

Level of the new program	Bachelor's	College
	percent	percent
Allowing for overlapping between the graduate program and the re-entry program		
Total number of observations	8,760	6,064
Below postsecondary education	1.2	17.8
College or CEGEP	3.8	37.1
University transfer program at a college or a CEGEP	0.0	1.5
College: Post diploma or graduate level	0.2	0.9
University diploma or certificate below bachelor's	4.6	1.4
Bachelor's degree	26.2	18.9
First professional degree	13.7	0.1
Graduate-level diploma or certificate above bachelor's, below master's	0.3	0.0
Master's degree	15.1	0.1
Doctorate degree	0.1	0.0
Other level of post-secondary education	0.0	0.0
Non-program	34.8	22.1
Total	**100.0**	**100.0**
No overlapping between the graduate program and the re-entry program		
Total number of observations	6,808	5,151
Below postsecondary education	1.1	20.4
College or CEGEP	3.9	39.0
University transfer program at a college or a CEGEP	0.0	1.2
College: Post diploma or graduate level	0.2	0.9
University diploma or certificate below bachelor's	4.3	1.5
Bachelor's degree	26.2	18.1
First professional degree	14.8	0.1
Graduate-level diploma or certificate above bachelor's, below master's	0.3	0.0
Master's degree	14.8	0.1
Doctorate degree	0.1	0.0
Other level of post-secondary education	0.0	0.0
Non-program	34.2	18.6
Total	**100.0**	**100.0**

0 true zero or a value rounded to zero
Notes: The codes are taken from the Postsecondary Student Information System documentation, and are standard.
Calculated using the samples of observed new programs corresponding to the rates shown in Tables 15 and 16.
Source: *Longitudinal Postsecondary Student Information System.*

Appendix 1

Selection criteria for sample 1

This appendix shows the sample selection rules with respect to which programs were selected into the samples and which were rejected with the aid of a graphic (see below the text) which sketches out a number of possible cases.

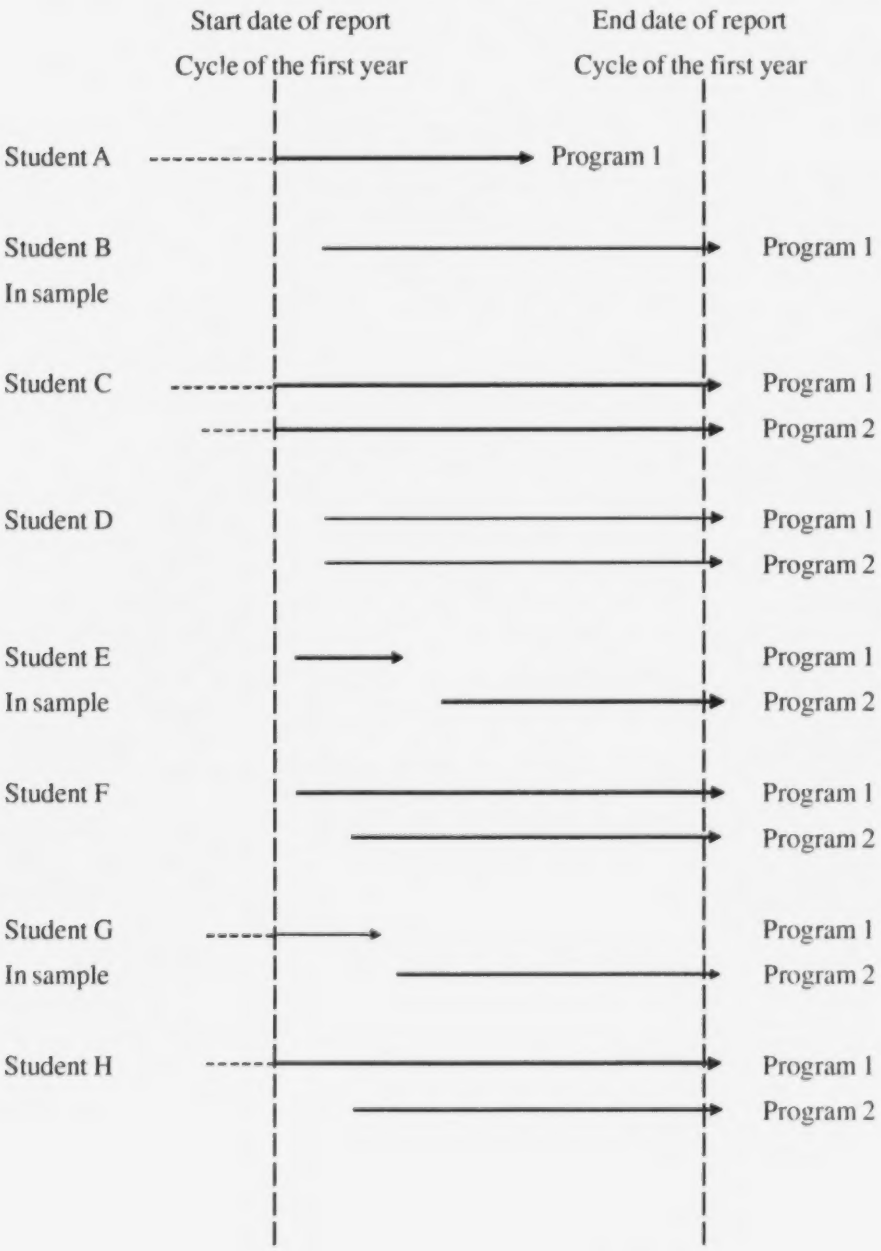
As shown in the graphic, students B, E, and G are chosen into the sample:

- Student B has one regular program during the first year. This program starts after the start date of the report cycle of the current year, and there are no other programs this year.
- Student E has two regular programs during the first year, but the first ended "cleanly" before the beginning of the second, so it is considered a new program and is selected into our sample.
- Student G has two regular programs during the first year. He/she is chosen because the later program starts after the start date of the report cycle of the first year, and it is clean (the earlier one has finished before the start of the later one).

Students (A, C, D, F, and H) are *not* chosen into the sample:

- Student A has one regular program during the current year. He/she is not chosen, however, because this program starts before the start date of report cycle of the first year, so we did not observe its start and are unable to track it from that point.
- Student C has two regular program records during the first year. He/she is not chosen because both programs start before the start date of report cycle of the current year.
- Student D has two regular programs during the first year. He/she is not chosen because, although both programs start after the start date of report cycle of the first year, the two programs start simultaneously.
- Student F has two regular programs during the first year. He/she is not chosen because although both programs start after the start date of the report cycle of the current year, the earlier one has not finished before the start of the later one.
- Student H has two regular programs during the first year. He/she is not chosen because although the later program starts after the start date of the report cycle of the current year, the earlier program has not finished before the start of the later one.

Figure 2
Student selected into the sample



Appendix 2

Additional provincial findings

Table A.2.1
Hazard transition rates by sex and province, sample 2, all ages

	Year 1					Year 2				
	Observations	Continuer	Graduate	Switcher	Leaver	Observations	Continuer	Graduate	Switcher	Leaver
	number	percent	percent	percent	percent	number	percent	percent	percent	percent
Bachelor										
Newfoundland and Labrador										
Male	1,285	72.8	3.1	3.3	20.8	408	73.0	2.5	5.4	19.1
Female	1,460	76.9	3.0	2.3	17.7	526	79.8	3.4	1.5	15.2
Prince Edward Island										
Male	536	75.7	0.0	4.9	19.4	186	77.4	1.1	2.7	18.8
Female	850	77.2	0.2	5.8	16.8	307	84.0	1.0	4.6	10.4
Nova Scotia										
Male	3,878	78.0	0.6	4.5	17.0	1,482	80.0	4.0	2.4	13.6
Female	6,217	80.3	0.6	5.1	14.1	2,384	83.3	2.3	3.8	10.6
New Brunswick										
Male	3,383	74.2	0.8	4.0	21.0	1,353	78.3	2.4	3.6	15.7
Female	4,856	77.3	0.7	5.0	17.0	2,104	83.3	1.5	4.5	10.7
College										
Newfoundland and Labrador										
Male	1,411	72.6	2.1	0.9	24.4	628	49.0	29.5	1.0	20.5
Female	1,497	67.8	9.2	0.5	22.5	564	24.5	56.2	0.7	18.6
Prince Edward Island										
Male	933	53.6	30.9	0.8	14.8	207	6.8	84.5	0.0	8.7
Female	646	60.7	23.7	0.6	15.0	198	10.6	82.3	0.0	7.1
Nova Scotia										
Male	4,007	46.1	29.1	0.7	24.2	1,034	17.1	58.4	0.6	23.9
Female	3,535	41.4	34.2	1.2	23.1	809	12.2	63.0	1.6	23.1
New Brunswick										
Male	2,626	35.3	42.2	1.1	21.5	420	22.6	57.4	0.2	19.8
Female	1,937	46.4	29.9	0.9	22.8	415	11.3	80.0	0.7	8.0

0 true zero or a value rounded to zero

Note: Only "continuers" are carried forward to the following year, while "graduates", "switchers" and "leavers", having made one of the relevant transitions, are not followed further. See the text for further details regarding the calculations. This treatment applies to the other hazard transition rates shown in other tables.

Source: *Longitudinal Postsecondary Student Information System.*

Table A.2.2
Hazard transition rates by sex and province, sample 2, age 17 to 20

	Year 1					Year 2				
	Observations	Continuer	Graduate	Switcher	Leaver	Observations	Continuer	Graduate	Switcher	Leaver
	number	percent	percent	percent	percent	number	percent	percent	percent	percent
Bachelor										
Newfoundland and Labrador										
Male	942	79.1	0.3	4.0	16.6	308	76.9	1.0	6.5	15.6
Female	1,096	83.4	0.0	2.7	13.9	409	86.3	0.2	2.0	11.5
Prince Edward Island										
Male	448	79.2	0.0	4.5	16.3	156	80.8	0.0	1.9	17.3
Female	728	78.6	0.0	5.5	15.9	261	85.4	0.0	4.2	10.3
Nova Scotia										
Male	3,057	80.2	0.0	4.9	14.9	1,151	83.1	1.7	2.7	12.5
Female	4,887	82.5	0.0	5.8	11.6	1,883	85.6	0.7	4.5	9.2
New Brunswick										
Male	2,789	75.8	0.0	4.4	19.7	1,141	79.3	1.1	3.9	15.7
Female	4,145	78.4	0.2	5.5	15.9	1,829	83.9	0.5	5.1	10.5
College										
Newfoundland and Labrador										
Male	931	77.0	0.6	0.9	21.5	450	51.8	26.0	1.3	20.9
Female	779	67.8	6.0	0.5	25.7	290	29.0	48.3	1.4	21.4
Prince Edward Island										
Male	507	61.9	22.3	1.0	14.8	121	8.3	83.5	0.0	8.3
Female	354	67.8	15.8	0.8	15.5	119	12.6	80.7	0.0	6.7
Nova Scotia										
Male	2,113	47.5	26.0	0.9	25.6	520	19.8	55.0	0.6	24.6
Female	1,492	44.8	27.6	2.1	25.5	349	16.6	57.9	1.1	24.4
New Brunswick										
Male	1,466	36.8	41.4	1.6	20.1	233	25.8	51.9	0.0	22.3
Female	861	47.3	27.3	1.7	23.7	197	11.2	79.7	1.0	8.1

0 true zero or a value rounded to zero

Note: Only "continuers" are carried forward to the following year, while "graduates", "switchers" and "leavers", having made one of the relevant transitions, are not followed further. See the text for further details regarding the calculations. This treatment applies to the other hazard transition rates shown in other tables.

Source: *Longitudinal Postsecondary Student Information System.*

Table A.2.3
Cumulative transition rates by sex and province, sample 2, all ages

	Year 1					Year 2				
	Observations	Continuer	Graduate	Switcher	Leaver	Observations	Continuer	Graduate	Switcher	Leaver
	number	percent	percent	percent	percent	number	percent	percent	percent	percent
Bachelor										
Newfoundland and Labrador										
Male	1,285	72.8	3.1	3.3	20.8	1,285	53.1	4.9	7.3	34.7
Female	1,460	76.9	3.0	2.3	17.7	1,460	61.4	5.6	3.5	29.4
Prince Edward Island										
Male	536	75.7	0.0	4.9	19.4	536	58.6	0.8	6.9	33.7
Female	850	77.2	0.2	5.8	16.8	850	64.9	1.0	9.3	24.9
Nova Scotia										
Male	3,878	78.0	0.6	4.5	17.0	3,878	62.4	3.7	6.4	27.5
Female	6,217	80.3	0.6	5.1	14.1	6,217	66.9	2.4	8.1	22.5
New Brunswick										
Male	3,383	74.2	0.8	4.0	21.0	3,383	58.1	2.6	6.7	32.6
Female	4,856	77.3	0.7	5.0	17.0	4,856	64.3	1.9	8.5	25.3
College										
Newfoundland and Labrador										
Male	1,411	72.6	2.1	0.9	24.4	1,411	35.6	23.5	1.6	39.3
Female	1,497	67.8	9.2	0.5	22.5	1,497	16.6	47.3	0.9	35.1
Prince Edward Island										
Male	933	53.6	30.9	0.8	14.8	933	3.6	76.2	0.8	19.5
Female	646	60.7	23.7	0.6	15.0	646	6.4	73.6	0.6	19.3
Nova Scotia										
Male	4,007	46.1	29.1	0.7	24.2	4,007	7.9	56.0	0.9	35.2
Female	3,535	41.4	34.2	1.2	23.1	3,535	5.1	60.3	1.9	32.7
New Brunswick										
Male	2,626	35.3	42.2	1.1	21.5	2,626	8.0	62.4	1.2	28.5
Female	1,937	46.4	29.9	0.9	22.8	1,937	5.3	67.0	1.2	26.5

0 true zero or a value rounded to zero

Note: Calculated from the annual transition (hazard) rates shown in Table 8.

Source: *Longitudinal Postsecondary Student Information System.*

Table A.2.4
Cumulative transition rates by sex and province, sample 2, age 17 to 20

	Year 1					Year 2				
	Observations	Continuer	Graduate	Switcher	Leaver	Observations	Continuer	Graduate	Switcher	Leaver
	number	percent	percent	percent	percent	number	percent	percent	percent	percent
Bachelor										
Newfoundland and Labrador										
Male	942	79.1	0.3	4.0	16.6	942	60.9	1.1	9.2	28.9
Female	1,096	83.4	0.0	2.7	13.9	1,096	72.0	0.2	4.4	23.5
Prince Edward Island										
Male	448	79.2	0.0	4.5	16.3	448	64.0	0.0	6.0	30.0
Female	728	78.6	0.0	5.5	15.9	728	67.1	0.0	8.8	24.1
Nova Scotia										
Male	3,057	80.2	0.0	4.9	14.9	3,057	66.6	1.4	7.1	24.9
Female	4,887	82.5	0.0	5.8	11.6	4,887	70.6	0.6	9.6	19.2
New Brunswick										
Male	2,789	75.8	0.0	4.4	19.7	2,789	60.1	0.8	7.4	31.6
Female	4,145	78.4	0.2	5.5	15.9	4,145	65.8	0.6	9.5	24.2
College										
Newfoundland and Labrador										
Male	931	77.0	0.6	0.9	21.5	931	39.9	20.7	1.9	37.6
Female	779	67.8	6.0	0.5	25.7	779	19.6	38.8	1.4	40.2
Prince Edward Island										
Male	507	61.9	22.3	1.0	14.8	507	5.1	74.0	1.0	19.9
Female	354	67.8	15.8	0.8	15.5	354	8.5	70.5	0.8	20.1
Nova Scotia										
Male	2,113	47.5	26.0	0.9	25.6	2,113	9.4	52.1	1.2	37.3
Female	1,492	44.8	27.6	2.1	25.5	1,492	7.4	53.5	2.6	36.4
New Brunswick										
Male	1,466	36.8	41.4	1.6	20.1	1,466	9.5	60.5	1.6	28.3
Female	861	47.3	27.3	1.7	23.7	861	5.3	65.0	2.2	27.5

0 true zero or a value rounded to zero

Note: Calculated from the annual transition (hazard) rates shown in Table 9.

Source: *Longitudinal Postsecondary Student Information System.*

Table A.2.5

Hazard rates of returning to postsecondary education among leavers by province, sample 2, age 17 to 20, same institution

	Total			Same institution			
	Observations	All returners	All returners	Same level	Same level	Different level	Different level
	number	percent	distribution	percent	distribution	percent	distribution
Bachelor's							
Newfoundland and Labrador	252	20.6	100.0	13.5	65.4	0.4	1.9
Prince Edward Island	120	16.7	100.0	6.7	40.0	0.0	0.0
Nova Scotia	764	18.2	100.0	7.6	41.7	0.0	0.0
New Brunswick	820	22.1	100.0	11.6	52.5	0.0	0.0
College							
Newfoundland and Labrador	340	10.0	100.0	7.6	76.5	0.3	2.9
Prince Edward Island	141	13.5	100.0	9.2	68.4	0.0	0.0
Nova Scotia	962	8.9	100.0	7.6	84.9	0.0	0.0
New Brunswick	512	12.7	100.0	10.4	81.5	0.0	0.0

0 true zero or a value rounded to zero

Note: These returning rates are calculated for those identified as postsecondary leavers in the preceding part of the analysis.

Source: *Longitudinal Postsecondary Student Information System.*

Table A.2.6

Hazard rates of returning to postsecondary education among leavers by province, sample 2, age 17 to 20, different institution

				Different institution							
	Total			Same level				Different level			
	Observations	All returners	All returners	Same province	Same province	Different province	Different province	Same province	Same province	Different province	Different province
	number	percent	distribution	percent	distribution	percent	distribution	percent	distribution	percent	distribution
Bachelor's											
N.L.	252	20.6	100.0	0.4	1.9	1.2	5.8	5.2	25.0	0.0	0.0
P.E.I.	120	16.7	100.0	0.0	0.0	2.5	15.0	6.7	40.0	0.3	5.0
N.S.	764	18.2	100.0	4.5	24.5	1.7	9.4	3.3	18.0	1.2	6.5
N.B.	820	22.1	100.0	1.0	4.4	2.9	13.3	4.6	21.0	2.0	8.8
College											
N.L.	340	10.0	100.0	0.0	0.0	0.6	5.9	1.5	14.7	0.0	0.0
P.E.I.	141	13.5	100.0	0.0	0.0	2.8	21.1	0.7	5.3	0.7	5.3
N.S.	962	8.9	100.0	0.1	1.2	0.3	3.5	0.9	10.5	0.0	0.0
N.B.	512	12.7	100.0	0.0	0.0	0.2	1.5	2.0	15.4	0.2	1.5

0 true zero or a value rounded to zero

Note: These returning rates are calculated for those identified as postsecondary leavers in the preceding part of the analysis.

Source: *Longitudinal Postsecondary Student Information System.*

Table A.2.7

Hazard rates of returning to postsecondary education among leavers by province, sample 2, age 17 to 20, same institution

	Total			Same institution			
	Observations	All returners	All returners	Same level	Same level	Different level	Different level
	number	percent	distribution	percent	distribution	percent	distribution
Bachelor's							
Newfoundland and Labrador	122	32.8	100.0	20.5	62.5	0.0	0.0
Prince Edward Island	83	24.1	100.0	9.6	40.0	0.0	0.0
Nova Scotia	482	22.8	100.0	8.5	37.3	0.0	0.0
New Brunswick	638	25.2	100.0	13.0	51.6	0.0	0.0
College							
Newfoundland and Labrador	202	10.9	100.0	6.9	63.6	0.5	4.5
Prince Edward Island	75	12.0	100.0	5.3	44.4	0.0	0.0
Nova Scotia	477	9.6	100.0	7.5	78.3	0.0	0.0
New Brunswick	262	15.3	100.0	12.6	82.5	0.0	0.0

0 true zero or a value rounded to zero

Note: These returning rates are calculated for those identified as postsecondary leavers in the preceding part of the analysis.

Source: *Longitudinal Postsecondary Student Information System.*

Table A.2.8

Hazard rates of returning to postsecondary education among leavers by province, sample 2, age 17 to 20, different institution

				Different institution							
	Total			Same level				Different level			
	Observations	All returners	All returners	Same province	Same province	Different province	Different province	Same province	Same province	Different province	Different province
	number	percent	distribution	percent	distribution	percent	distribution	percent	distribution	percent	distribution
Bachelor's											
N.L.	122	32.8	100.0	0.8	2.5	2.5	7.5	9.0	27.5	0.0	0.0
P.E.I.	83	24.1	100.0	0.0	0.0	3.6	15.0	9.6	40.0	1.2	5.0
N.S.	482	22.8	100.0	5.8	25.5	2.3	10.0	5.0	21.8	1.2	5.5
N.B.	638	25.2	100.0	1.3	5.0	3.6	14.3	5.0	19.9	2.4	9.3
College											
N.L.	202	10.9	100.0	0.0	0.0	1.0	9.1	2.5	22.7	0.0	0.0
P.E.I.	75	12.0	100.0	0.0	0.0	4.0	33.3	1.3	11.1	1.3	11.1
N.S.	477	9.6	100.0	0.2	2.2	0.6	6.5	1.3	13.0	0.0	0.0
N.B.	262	15.3	100.0	0.0	0.0	0.0	0.0	2.7	17.5	0.0	0.0

0 true zero or a value rounded to zero

Note: These returning rates are calculated for those identified as postsecondary leavers in the preceding part of the analysis.

Source: *Longitudinal Postsecondary Student Information System.*

Table A.2.9

Hazard rates of starting a new program among graduates by province

	Bachelor's		College	
	Observations		Observations	
	number	percent	number	percent
Allowing for overlapping between the graduate program and the new program				
Newfoundland and Labrador				
Year 1	6,061	31.2	3,841	18.5
Year 2	2,821	11.1	2,020	6.6
Year 3	1,275	6.0	728	6.0
Prince Edward Island				
Year 1	756	36.4	3,495	23.2
Year 2	222	12.2	2,061	8.2
Year 3	x	x	1,213	5.4
Nova Scotia				
Year 1	12,911	26.5	9,670	18.3
Year 2	5,405	7.6	5,009	9.2
Year 3	1,132	4.8	2,182	7.3
New Brunswick				
Year 1	8,360	22.7	7,483	15.4
Year 2	4,131	7.4	4,424	10.5
Year 3	1,591	5.5	2,144	6.1
No overlapping between the graduate program and the new program				
Newfoundland and Labrador				
Year 1	5,261	27.8	3,274	14.9
Year 2	2,587	11.0	1,831	6.7
Year 3	1,178	6.3	671	6.1
Prince Edward Island				
Year 1	618	36.1	2,967	17.9
Year 2	181	12.2	1,838	8.4
Year 3	x	x	1,114	5.3
Nova Scotia				
Year 1	10,854	22.3	9,349	16.4
Year 2	4,874	7.5	4,974	9.2
Year 3	1,072	4.8	2,175	7.3
New Brunswick				
Year 1	7,748	19.7	7,256	14.0
Year 2	3,989	7.3	4,353	10.5
Year 3	1,567	5.6	2,117	6.0

x suppressed to meet the confidentiality requirements of the *Statistics Act*

Note: Calculated from the annual transition (hazard) rates shown in Tables A.2.5 and A.2.6.

Source: *Longitudinal Postsecondary Student Information System.*

Table A.2.10
Cumulative rates of starting a new program among graduates by province

	Bachelor's		College	
	Observations		Observations	
	number	percent	number	percent
Allowing for overlapping between the graduate program and the new program				
Newfoundland and Labrador				
Year 1	6,061	31.2	3,841	18.5
Year 2	6,061	38.8	3,841	23.8
Year 3	6,061	42.5	3,841	28.4
Prince Edward Island				
Year 1	756	36.4	3,495	23.2
Year 2	756	44.1	3,495	29.5
Year 3	x	x	3,495	33.3
Nova Scotia				
Year 1	12,911	26.5	9,670	18.3
Year 2	12,911	32.1	9,670	25.8
Year 3	12,911	35.3	9,670	31.2
New Brunswick				
Year 1	8,360	22.7	7,483	15.4
Year 2	8,360	28.4	7,483	24.3
Year 3	8,360	32.4	7,483	28.9
No overlapping between the graduate program and the new program				
Newfoundland and Labrador				
Year 1	5,261	27.8	3,274	14.9
Year 2	5,261	35.8	3,274	20.6
Year 3	5,261	39.8	3,274	25.4
Prince Edward Island				
Year 1	618	36.1	2,967	17.9
Year 2	618	43.9	2,967	24.9
Year 3	x	x	2,967	28.8
Nova Scotia				
Year 1	10,854	22.3	9,349	16.4
Year 2	10,854	28.1	9,349	24.1
Year 3	10,854	31.5	9,349	29.7
New Brunswick				
Year 1	7,748	19.7	7,256	14.0
Year 2	7,748	25.6	7,256	23.0
Year 3	7,748	29.8	7,256	27.7

x suppressed to meet the confidentiality requirements of the *Statistics Act*
Note: Calculated from the annual transition (hazard) rates shown in Tables A.2.7 and A.2.8.
Source: *Longitudinal Postsecondary Student Information System.*

Appendix 3

Institutional-level findings

Table A.3.1
Sample characteristics

	Sample 1			Sample 2, all ages			Sample 2, age 17 to 20		
	Total	Bachelor	College	Total	Bachelor	College	Total	Bachelor	College
	percent	percent	percent	percent	percent	percent	percent	percent	percent
Number of observations	109,815	56,895	36,164	45,719	22,483	16,787	28,350	18,101	8,637
University									
Memorial University of Newfoundland	9.0	13.4	0.0	7.4	12.2	0.0	7.3	11.3	0.0
University of Prince Edward Island	3.2	5.1	0.0	3.5	6.2	0.0	4.4	6.5	0.0
Acadia University	2.8	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Atlantic School of Theology	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cape Breton University	3.5	5.4	1.2	0.0	0.0	0.0	0.0	0.0	0.0
Dalhousie University	11.2	13.7	0.0	14.7	19.9	0.0	14.3	20.3	0.0
University of King's College	1.0	1.9	0.0	1.4	2.9	0.0	2.0	3.2	0.0
Mount St. Vincent University	3.5	4.5	0.0	4.2	6.2	0.0	3.1	4.7	0.0
Nova Scotia Agricultural College	0.7	1.0	0.6	0.9	1.3	0.6	1.1	1.3	0.8
NSCAD University	0.6	1.2	0.0	0.1	0.3	0.0	0.1	0.1	0.0
Université Sainte-Anne	0.4	0.3	0.0	0.4	0.4	0.0	0.5	0.3	0.0
St. Francis Xavier University	4.5	6.9	0.0	6.2	10.5	0.0	7.5	11.4	0.0
Saint Mary's University	4.9	8.2	0.0	2.0	3.5	0.0	1.7	2.6	0.0
Mount Allison University	2.2	4.2	0.0	1.4	2.8	0.0	2.0	3.1	0.0
University of New Brunswick	9.5	14.6	0.0	10.6	17.9	0.0	12.2	18.8	0.0
Université de Moncton	7.4	10.9	0.0	5.7	9.1	0.0	6.8	9.2	0.0
St. Thomas University	2.4	4.3	0.0	3.5	6.8	0.0	4.9	7.2	0.0
College									
College of the North Atlantic	5.5	0.0	16.9	7.8	0.0	17.3	8.1	0.0	19.8
Holland College	3.0	0.0	9.0	3.8	0.0	10.2	3.5	0.0	11.4
Nova Scotia Community College	13.5	0.0	40.9	16.3	0.0	44.5	12.5	0.0	41.0
Maritime College of Forest Technology	0.1	0.0	0.2	0.1	0.0	0.1	0.0	0.0	0.1
New Brunswick Community College	10.3	0.0	31.3	10.0	0.0	27.2	8.2	0.0	26.9

0 true zero or a value rounded to zero
Source: *Longitudinal Postsecondary Student Information System.*

Table A.3.2

Hazard transition rates at institutional level, sample 1, year 1

	Year 1				
	Observations	Continuer	Graduate	Switcher	Leaver
	number	percent	percent	percent	percent
Bachelor program					
Memorial University of Newfoundland	7,625	76.1	4.6	1.9	17.4
University of Prince Edward Island	2,912	75.8	1.7	4.8	17.6
Acadia University	2,580	82.6	0.2	1.0	16.2
Cape Breton University	3,092	68.5	0.6	1.5	29.4
Dalhousie University	7,789	82.1	1.0	3.8	13.1
University of King's College	1,068	71.1	8.0	5.8	15.2
Mount St. Vincent University	2,572	71.3	2.3	5.5	20.9
Nova Scotia Agricultural College	F	F	F	F	F
NSCAD University	F	F	F	F	F
Université Sainte-Anne	F	F	F	F	F
St. Francis Xavier University	3,929	74.8	0.0	5.7	19.6
Saint Mary's University	4,645	66.2	1.5	1.7	30.7
Mount Allison University	2,375	80.5	3.2	3.4	13.0
University of New Brunswick	8,298	76.3	3.1	3.7	16.9
Université de Moncton	6,206	70.4	8.2	2.3	19.2
St. Thomas University	2,430	68.9	2.9	7.2	20.9
College program					
College of the North Atlantic	6,096	70.5	7.3	0.5	21.6
Holland College	3,252	52.7	30.2	0.5	16.7
Cape Breton University	F	F	F	F	F
Nova Scotia Agricultural College	F	F	F	F	F
Nova Scotia Community College	14,785	43.8	33.5	0.8	21.9
Maritime College of Forest Technology	F	F	F	F	F
New Brunswick Community College	11,324	36.8	37.2	0.9	25.1

0 true zero or a value rounded to zero
F too unreliable to be published
Source: *Longitudinal Postsecondary Student Information System.*

Table A.3.3

Hazard transition rates at institutional level, sample 1, year 2

	Year 2				
	Observations	Continuer	Graduate	Switcher	Leaver
	number	percent	percent	percent	percent
Bachelor program					
Memorial University of Newfoundland	4,492	77.6	8.9	1.8	11.7
University of Prince Edward Island	1,594	77.3	9.8	2.6	10.2
Acadia University	1,316	85.0	2.7	0.7	11.6
Cape Breton University	1,455	72.8	6.5	1.4	19.2
Dalhousie University	4,408	83.8	3.7	3.0	9.6
University of King's College	522	82.2	1.9	4.2	11.7
Mount St. Vincent University	1,297	75.3	6.4	3.0	15.3
Nova Scotia Agricultural College	F	F	F	F	F
NSCAD University	F	F	F	F	F
Université Sainte-Anne	F	F	F	F	F
St. Francis Xavier University	1,886	83.5	2.9	3.0	10.7
Saint Mary's University	2,391	62.6	12.2	1.8	23.5
Mount Allison University	1,366	79.7	6.6	3.9	9.8
University of New Brunswick	4,595	79.0	6.6	2.5	12.0
Université de Moncton	3,509	71.8	15.8	1.9	10.6
St. Thomas University	1,163	77.5	3.4	5.2	13.9
College program					
College of the North Atlantic	3,420	37.0	44.2	0.6	18.3
Holland College	1,185	8.0	78.1	0.3	13.5
Cape Breton University	F	F	F	F	F
Nova Scotia Agricultural College	F	F	F	F	F
Nova Scotia Community College	4,990	19.6	51.7	1.0	27.7
Maritime College of Forest Technology	F	F	F	F	F
New Brunswick Community College	2,947	17.9	66.8	0.2	15.0

F too unreliable to be published

Source: *Longitudinal Postsecondary Student Information System.*

Table A.3.4

Hazard transition rates at institutional level, sample 1, year 3

	Year 3				
	Observations	Continuer	Graduate	Switcher	Leaver
	number	percent	percent	percent	percent
Bachelor program					
Memorial University of Newfoundland	2,617	68.1	23.9	1.0	7.0
University of Prince Edward Island	771	67.3	23.5	1.8	7.4
Acadia University	517	78.7	11.8	0.6	8.9
Cape Breton University	582	68.0	16.8	0.7	14.4
Dalhousie University	2,142	72.0	20.7	1.4	6.0
University of King's College	225	82.2	9.8	1.8	6.2
Mount St. Vincent University	541	59.9	25.5	3.7	10.9
Nova Scotia Agricultural College	F	F	F	F	F
NSCAD University	F	F	F	F	F
Université Sainte-Anne	F	F	F	F	F
St. Francis Xavier University	797	77.5	9.0	1.4	12.0
Saint Mary's University	993	41.5	44.9	0.6	13.0
Mount Allison University	639	64.8	28.8	1.1	5.3
University of New Brunswick	2,164	75.0	17.1	0.9	7.0
Université de Moncton	1,806	62.0	32.2	0.7	5.2
St. Thomas University	423	83.9	7.3	0.9	7.8
College program					
College of the North Atlantic	800	39.8	42.3	0.9	17.1
Holland College	46	17.4	58.7	0.0	23.9
Cape Breton University	F	F	F	F	F
Nova Scotia Agricultural College	F	F	F	F	F
Nova Scotia Community College	708	20.6	41.9	1.4	36.0
Maritime College of Forest Technology	F	F	F	F	F
New Brunswick Community College	349	22.3	59.0	0.6	18.1

0 true zero or a value rounded to zero

F too unreliable to be published

Source: *Longitudinal Postsecondary Student Information System.*

Table A.3.5
Hazard transition rates at institutional level, sample 2, all ages

	Year 1					Year 2				
	Observations	Continuer	Graduate	Switcher	Leaver	Observations	Continuer	Graduate	Switcher	Leaver
	number	percent	percent	percent	percent	number	percent	percent	percent	percent
Bachelor's degree										
Memorial University of Newfoundland	2,751	75.0	3.1	2.8	19.1	935	76.8	3.0	3.2	17.0
University of Prince Edward Island	1,388	76.5	0.1	5.5	17.9	493	81.5	1.0	3.9	13.6
Dalhousie University	4,476	82.1	0.1	4.0	13.8	1,724	85.8	1.9	3.0	9.3
University of King's College	654	73.9	6.9	5.0	14.2	247	81.8	1.2	4.5	12.6
Mount St. Vincent University	1,392	71.5	0.0	6.9	21.6	511	77.3	1.4	3.7	17.6
Nova Scotia Agricultural College	F	F	F	F	F	F	F	F	F	F
NSCAD University	F	F	F	F	F	F	F	F	F	F
Université Sainte-Anne	F	F	F	F	F	F	F	F	F	F
St. Francis Xavier University	2,362	83.4	0.0	4.8	11.7	931	83.6	3.1	2.8	10.5
Saint Mary's University	785	77.3	0.9	3.9	17.8	334	71.0	10.8	1.2	17.1
Mount Allison University	635	82.8	0.3	4.6	12.3	522	81.4	1.0	5.4	12.3
University of New Brunswick	4,035	77.5	0.3	4.4	17.8	1,579	81.6	2.7	3.1	12.6
Université de Moncton	2,048	76.7	0.7	3.1	19.4	792	80.7	1.9	4.3	13.1
St. Thomas University	1,523	68.3	2.2	7.1	22.5	564	81.2	0.4	5.7	12.8
College program										
College of the North Atlantic	2,910	70.1	5.8	0.7	23.4	1,192	37.4	42.1	0.8	19.6
Holland College	1,715	59.7	25.8	0.6	13.8	478	7.3	84.3	0.0	8.4
Nova Scotia Agricultural College	F	F	F	F	F	F	F	F	F	F
Nova Scotia Community College	7,465	43.3	32.0	0.9	23.8	1,798	14.1	61.3	0.9	23.6
Maritime College of Forest Technology	F	F	F	F	F	F	F	F	F	F
New Brunswick Community College	4,567	39.7	37.1	1.0	22.2	839	17.2	68.5	0.5	13.8

0 true value or a value rounded to zero

F too unreliable to be published

Source: *Longitudinal Postsecondary Student Information System.*

Table A.3.6
Hazard transition rates at institutional level, sample 2, age 17 to 20

	Year 1					Year 2				
	Observations	Continuer	Graduate	Switcher	Leaver	Observations	Continuer	Graduate	Switcher	Leaver
	number	percent	percent	percent	percent	Number	percent	percent	percent	percent
Bachelor's degree										
Memorial University of Newfoundland	2,040	81.0	0.1	3.3	15.1	717	82.3	0.6	3.9	13.2
University of Prince Edward Island	1,178	78.7	0.0	5.2	16.1	417	83.7	0.0	3.4	12.9
Dalhousie University	3,675	83.6	0.0	4.5	11.8	1386	87.5	0.2	3.4	8.9
University of King's College	574	79.3	0.0	5.4	15.3	231	84.0	0.0	4.8	11.3
Mount St. Vincent University	857	73.2	0.0	8.8	18.1	322	79.2	0.6	5.6	14.6
Nova Scotia Agricultural College	F	F	F	F	F	F	F	F	F	F
NSCAD University	F	F	F	F	F	F	F	F	F	F
Université Sainte-Anne	F	F	F	F	F	F	F	F	F	F
St. Francis Xavier University	2,061	84.1	0.0	5.1	10.7	791	84.7	2.1	3.0	10.1
Saint Mary's University	473	80.3	0.2	5.1	14.4	200	81.0	3.0	2.0	14.0
Mount Allison University	568	85.2	0.0	4.9	9.9	484	82.9	0.4	5.6	11.2
University of New Brunswick	3,408	78.0	0.2	4.8	16.9	1312	82.9	1.1	3.5	12.6
Université de Moncton	1,663	78.4	0.0	3.5	18.2	660	81.2	0.5	5.0	13.3
St. Thomas University	1,296	70.9	0.0	7.8	21.3	514	80.9	0.4	6.2	12.5
College program										
College of the North Atlantic	1,710	72.8	3.1	0.7	23.4	740	42.8	34.7	1.4	21.1
Holland College	985	68.6	17.2	0.8	13.4	309	8.1	83.8	0.0	8.1
Nova Scotia Agricultural College	F	F	F	F	F	F	F	F	F	F
Nova Scotia Community College	3,540	45.7	27.2	1.3	25.8	836	17.3	57.2	0.7	24.8
Maritime College of Forest Technology	F	F	F	F	F	F	F	F	F	F
New Brunswick Community College	2,325	40.4	36.4	1.7	21.5	432	19.4	64.4	0.5	15.7

0 true value or a value rounded to zero

F too unreliable to be published

Source: *Longitudinal Postsecondary Student Information System.*

Table A.3.7

Cumulative transition rates at institutional level, sample 1, year 1

	Total observations	Year 1			
		Continuer	Graduate	Switcher	Leaver
	number	percent	percent	percent	percent
Bachelor's degree					
Memorial University of Newfoundland	7,625	76.1	4.6	1.9	17.4
University of Prince Edward Island	2,912	75.8	1.7	4.8	17.6
Acadia University	2,580	82.6	0.2	1.0	16.2
Cape Breton University	3,092	68.5	0.6	1.5	29.4
Dalhousie University	7,789	82.1	1.0	3.8	13.1
University of King's College	1,068	71.1	8.0	5.8	15.2
Mount St. Vincent University	2,572	71.3	2.3	5.5	20.9
Nova Scotia Agricultural College	F	F	F	F	F
NSCAD University	F	F	F	F	F
Université Sainte-Anne	F	F	F	F	F
St. Francis Xavier University	3,929	74.8	0.0	5.7	19.6
Saint Mary's University	4,645	66.2	1.5	1.7	30.7
Mount Allison University	2,375	80.5	3.2	3.4	13.0
University of New Brunswick	8,298	76.3	3.1	3.7	16.9
Université de Moncton	6,206	70.4	8.2	2.3	19.2
St. Thomas University	2,430	68.9	2.9	7.2	20.9
College program					
College of the North Atlantic	6,096	70.5	7.3	0.5	21.6
Holland College	3,252	52.7	30.2	0.5	16.7
Cape Breton University	F	F	F	F	F
Nova Scotia Agricultural College	F	F	F	F	F
Nova Scotia Community College	14,785	43.8	33.5	0.8	21.9
Maritime College of Forest Technology	F	F	F	F	F
New Brunswick Community College	11,324	36.8	37.2	0.9	25.1

0 true zero or a value rounded to zero

F too unreliable to be published

Source: *Longitudinal Postsecondary Student Information System.*

Table A.3.8
Cumulative transition rates at institutional level, sample 1, year 2

	Total observations	Year 2			
		Continuer	Graduate	Switcher	Leaver
	number	percent	percent	percent	percent
Bachelor's degree					
Memorial University of Newfoundland	7,625	59.1	11.4	3.3	26.3
University of Prince Edward Island	2,912	58.6	9.2	6.8	25.4
Acadia University	2,580	70.1	2.5	1.6	25.8
Cape Breton University	3,092	49.9	5.1	2.5	42.6
Dalhousie University	7,789	68.8	3.9	6.3	21.0
University of King's College	1,068	58.4	9.3	8.8	23.5
Mount St. Vincent University	2,572	53.7	6.9	7.6	31.9
Nova Scotia Agricultural College	F	F	F	F	F
NSCAD University	F	F	F	F	F
Université Sainte-Anne	F	F	F	F	F
St. Francis Xavier University	3,929	62.4	2.1	7.9	27.6
Saint Mary's University	4,645	41.4	9.6	2.9	46.2
Mount Allison University	2,375	64.1	8.5	6.5	20.9
University of New Brunswick	8,298	60.3	8.1	5.6	26.1
Université de Moncton	6,206	50.5	19.3	3.6	26.6
St. Thomas University	2,430	53.4	5.3	10.8	30.5
College program					
College of the North Atlantic	6,096	26.1	38.4	1.0	34.5
Holland College	3,252	4.2	71.3	0.6	23.8
Cape Breton University	F	F	F	F	F
Nova Scotia Agricultural College	F	F	F	F	F
Nova Scotia Community College	14,785	8.6	56.1	1.2	34.0
Maritime College of Forest Technology	F	F	F	F	F
New Brunswick Community College	11,324	6.6	61.8	0.9	30.6

F too unreliable to be published
Source: *Longitudinal Postsecondary Student Information System.*

Table A.3.9

Cumulative transition rates at institutional level, sample 1, year 3

	Total observations	Year 3			
		Continuer	Graduate	Switcher	Leaver
	number	percent	percent	percent	percent
Bachelor's degree					
Memorial University of Newfoundland	7,625	40.3	25.5	3.8	30.4
University of Prince Edward Island	2,912	39.4	22.9	7.9	29.7
Acadia University	2,580	55.2	10.8	2.0	32.0
Cape Breton University	3,092	33.9	13.5	2.9	49.8
Dalhousie University	7,789	49.5	18.2	7.2	25.1
University of King's College	1,068	48.0	15.0	9.8	27.1
Mount St. Vincent University	2,572	32.1	20.5	9.6	37.7
Nova Scotia Agricultural College	F	F	F	F	F
NSCAD University	F	F	F	F	F
Université Sainte-Anne	F	F	F	F	F
St. Francis Xavier University	3,929	48.4	7.8	8.7	35.1
Saint Mary's University	4,645	17.2	28.2	3.1	51.6
Mount Allison University	2,375	41.6	26.9	7.2	24.3
University of New Brunswick	8,298	45.2	18.4	6.1	30.3
Université de Moncton	6,206	31.3	35.6	3.9	29.2
St. Thomas University	2,430	44.8	9.2	11.3	34.7
College program					
College of the North Atlantic	6,096	10.4	49.4	1.2	39.0
Holland College	3,252	0.7	73.8	0.6	24.8
Cape Breton University	F	F	F	F	F
Nova Scotia Agricultural College	F	F	F	F	F
Nova Scotia Community College	14,785	1.8	59.7	1.4	37.1
Maritime College of Forest Technology	F	F	F	F	F
New Brunswick Community College	11,324	1.5	65.7	1.0	31.8

0 true zero or a value rounded to zero

F too unreliable to be published

Source: *Longitudinal Postsecondary Student Information System.*

Table A.3.10

Cumulative transition rates at institutional level, sample 2, all ages

	Total observations	Year 1				Year 2			
		Continuer	Graduate	Switcher	Leaver	Continuer	Graduate	Switcher	Leaver
	number	percent	percent	percent	percent	percent	percent	percent	percent
Bachelor's degree									
Memorial University of Newfoundland	2,751	75.0	3.1	2.8	19.1	57.6	5.3	5.2	31.9
University of Prince Edward Island	1,388	76.5	0.1	5.5	17.9	62.4	0.9	8.4	28.3
Dalhousie University	4,476	82.1	0.1	4.0	13.8	70.5	1.6	6.4	21.5
University of King's College	654	73.9	6.9	5.0	14.2	60.4	7.8	8.3	23.5
Mount St. Vincent University	1,392	71.5	0.0	6.9	21.6	55.3	1.0	9.6	34.2
Nova Scotia Agricultural College	F	F	F	F	F	F	F	F	F
NSCAD University	F	F	F	F	F	F	F	F	F
Université Sainte-Anne	F	F	F	F	F	F	F	F	F
St. Francis Xavier University	2,362	83.4	0.0	4.8	11.7	69.7	2.6	7.2	20.5
Saint Mary's University	785	77.3	0.9	3.9	17.8	54.9	9.2	4.9	31.0
Mount Allison University	635	82.8	0.3	4.6	12.3	67.4	1.1	9.0	22.4
University of New Brunswick	4,035	77.5	0.3	4.4	17.8	63.2	2.4	6.8	27.6
Université de Moncton	2,048	76.7	0.7	3.1	19.4	61.9	2.2	6.4	29.5
St. Thomas University	1,523	68.3	2.2	7.1	22.5	55.5	2.4	11.0	31.2
College program									
College of the North Atlantic	2,910	70.1	5.8	0.7	23.4	26.2	35.3	1.3	37.2
Holland College	1,715	59.7	25.8	0.6	13.8	4.4	76.2	0.6	18.8
Nova Scotia Agricultural College	F	F	F	F	F	F	F	F	F
Nova Scotia Community College	7,465	43.3	32.0	0.9	23.8	6.1	58.6	1.3	34.0
Maritime College of Forest Technology	F	F	F	F	F	F	F	F	F
New Brunswick Community College	4,567	39.7	37.1	1.0	22.2	6.8	64.3	1.2	27.7

0 true value or a value rounded to zero
F too unreliable to be published

Source: *Longitudinal Postsecondary Student Information System.*

Table A.3.11

Cumulative transition rates at institutional level, sample 2, age 17 to 20

	Total observations	Year 1				Year 2			
		Continuer	Graduate	Switcher	Leaver	Continuer	Graduate	Switcher	Leaver
	number	percent	percent	percent	percent	percent	percent	percent	percent
Bachelor's degree									
Memorial University of Newfoundland	2,040	81.0	0.1	3.3	15.1	67.0	0.6	6.5	25.9
University of Prince Edward Island	1,178	78.7	0.0	5.2	16.1	65.9	0.0	7.8	26.3
Dalhousie University	3,675	83.6	0.0	4.5	11.8	73.2	0.2	7.3	19.3
University of King's College	574	79.3	0.0	5.4	15.3	66.6	0.0	9.2	24.3
Mount St. Vincent University	857	73.2	0.0	8.8	18.1	57.9	0.5	12.8	28.8
Nova Scotia Agricultural College	F	F	F	F	F	F	F	F	F
NSCAD University	F	F	F	F	F	F	F	F	F
Université Sainte-Anne	F	F	F	F	F	F	F	F	F
St. Francis Xavier University	2,061	84.1	0.0	5.1	10.7	71.3	1.8	7.7	19.2
Saint Mary's University	473	80.3	0.2	5.1	14.4	65.1	2.6	6.7	25.6
Mount Allison University	568	85.2	0.0	4.9	9.9	70.6	0.4	9.7	19.4
University of New Brunswick	3,408	78.0	0.2	4.8	16.9	64.6	1.0	7.6	26.7
Université de Moncton	1,663	78.4	0.0	3.5	18.2	63.6	0.4	7.4	28.6
St. Thomas University	1,296	70.9	0.0	7.8	21.3	57.4	0.3	12.2	30.1
College program									
College of the North Atlantic	1,710	72.8	3.1	0.7	23.4	31.2	28.4	1.7	38.7
Holland College	985	68.6	17.2	0.8	13.4	5.6	74.7	0.8	19.0
Nova Scotia Agricultural College	F	F	F	F	F	F	F	F	F
Nova Scotia Community College	3,540	45.7	27.2	1.3	25.8	7.9	53.3	1.6	37.1
Maritime College of Forest Technology	F	F	F	F	F	F	F	F	F
New Brunswick Community College	2,325	40.4	36.4	1.7	21.5	7.9	62.4	1.9	27.9

0 true value or a value rounded to zero
F too unreliable to be published

Source: *Longitudinal Postsecondary Student Information System.*

Appendix 4: Comparing the YITS and PSIS (and other proposed checks)

This appendix reports the results of some checks made of the findings reported in this study with what may be found using the YITS-B dataset, described earlier as probably the other best data source for studying persistence in PSE in Canada and the basis of other work undertaken by the authors (Finnie and Qiu (2008)). We also suggest other checks that might be carried out, including two file linkages that could be very interesting.

The YITS and PSIS datasets

The general strengths and weaknesses of the YITS and PSIS datasets have been mentioned in the main part of the paper. These stem mainly from the general characteristics of administrative data (the PSIS) and survey data (the YITS-B), and relate to coverage, attrition, and the variables available. Furthermore, in this case the YITS-B is a national level dataset, whereas the PSIS used in this analysis is limited to Atlantic Canada.

Appendix Table A.4.1 (below) shows the first year transition rates based on the PSIS, as presented above, as well as a set of YITS results that are roughly comparable to those reported in Finnie and Qiu (2008), but adjusted to be more directly comparable to the PSIS.

Table A.4.1

First-Year transition rates in the atlantic region in the Youth in Transition Survey and postsecondary information system

	Observations	Continuer	Graduate	Switcher	Leaver
	number	percent	percent	percent	percent
Bachelor					
Postsecondary Student Information System Survey	18,101	79.8	0.1	5.1	15.1
Youth in Transition Survey	1,412	81.2	0.4	7.8	10.5
College					
Postsecondary Student Information System Survey	8,637	52.6	23.5	1.3	22.6
Youth in Transition Survey	713	50.4	27.1	2.1	20.4

Notes: The Postsecondary Student Information System sample includes students from sample 2, age 17 to 20. See the text for the sample restriction of the YITS.

Source: *Longitudinal Postsecondary Student Information System* and *Youth in Transition Survey.*

In particular, the YITS analysis has been restricted to students attending institutions in the Atlantic region (rather than anywhere in Canada), and the definition of switching has been changed so that within-institution program changers, defined as switchers in the original YITS analysis, are re-classified as continuers. That is, we consider graduating from, continuing in, or leaving a given *institution* as the dynamics of interest, as has been done in the PSIS analysis, rather than graduating

from, continuing in, or leaving the initial *program*, as was done in the authors' original YITS work.

Furthermore, moves to institutions outside of the Atlantic region, defined as switchers in the YITS analysis, are now re-classified as leavers for the sake of these comparisons. This intentionally erroneous classification thus corresponds to the treatment in the PSIS analysis due to its capture of students in the Atlantic region only (meaning that those who continue their studies but leave the region to do so are registered as leavers).

There remain, though, other differences in the two datasets, and as a result in any related calculations, that need to be understood. First, the YITS analysis is based on the first PSE program taken by those individuals included in the YITS sample, who were age 18 to 20 in 2000. This could have occurred at any point over the period covered by the data, starting in 1996 (identified retroactively in the first interview) and continuing through the just-available Cycle IV survey carried out in 2006. As a result, the emphasis on first programs in the YITS analysis is more unambiguous than in the PSIS analysis, the age spread is a little different, and so is the period covered by the analysis.

Secondly, the YITS is subject to sample response bias, as discussed in the main part of the paper, whereas the PSIS should not be since it includes all individuals in all PSE programs (albeit in Atlantic Canada only) over the period covered. We might thus expect leaving rates, in particular, to be understated in the YITS, since leavers would likely be harder to follow over time, resulting in these dynamics being missed and the related transition estimates to be biased accordingly.

But in addition to this response bias, a substantial number of PSE profiles are difficult to classify in the YITS due to contradictory information given across surveys (e.g., the individual said he or she was in PSE at the end of one cycle, but at the next interview claimed that had not been the case), and estimated persistence rates vary considerably depending on the particular treatment of these cases.

Finally, the samples sizes for Atlantic Canada are small in the YITS, and the persistence estimates commensurately subject to wider variances.

For these and other related reasons we should, therefore, not expect the two sets of results to be identical. The question is: are they close, and do their differences correspond to what we might expect? And can they point us in the direction of other checks that could be carried out?

Comparing persistence rates in the YITS and PSIS

The first year continuing rates are in fact very close in the two sets of results. For bachelor's level students they are 79.8 percent in the PSIS and 81.2 percent in the YITS, while at the college level they are 52.6 and 50.4 percent in the PSIS and YITS respectively. The number of graduates also agrees fairly closely: negligible at the bachelor's level and 24 to 27 percent for college students. This similarity of findings is reassuring for both analyses.

The leaver and switcher rates, however, differ a little more. First year leaving rates are 15.1 percent in the PSIS and 10.5 percent in the YITS among bachelor's students, although they are a much closer 22.6 percent versus 20.4 percent among college graduates. This conforms to our expectation of possibly lower leaving rates

in the YITS due to its likely response/attrition bias as discussed above and elsewhere in the paper. And the fact that these differences are greater among bachelor's students than college students might be driven by the former being a more mobile group for whom going away to school (for example) – and hence perhaps also moving *after* leaving school and therefore being lost from the sample – is more common than is the case for college students.

Switcher rates are, conversely, a little *higher* in the YITS relative to the PSIS among bachelor's students: 5.1 percent in the PSIS versus 7.8 percent in the YITS (while they are everywhere low for college graduates). The reason for this difference is less obvious.

One concern we had was that the PSIS was in fact not picking up all switchers, perhaps because it was not catching all students from one year to the next when they moved between institutions. In particular, if a student moved from one institution to another and was not linked across those two years by the record matching methods employed by Statistics Canada, the student would be counted as a leaver rather than a switcher in our analysis, which could in theory help explain the differences in both leaver and switcher rates: leaver rates in the PSIS being higher, and switcher rates lower.

Presented with these findings, Statistics Canada took our concerns to heart, and checked once again their linkage programs (including extensive checks of the underlying micro records) and concluded once again that the record matching exercise which was used to create the longitudinal file used in the analysis did indeed identify the desired linkages, and that the problem just described (i.e., missing linkages as students moved institutions) was not likely to be the source of the observed differences as hypothesized.

Given the power of the individual identifiers on the file (SINs, full name and birth date information) and Statistics Canada's generally excellent track record in making such linkages based on their years of experience in doing so using a variety of different datasets across the bureau, it would probably have been surprising had missed linkages in fact been a major problem. The checks carried out affirm that supposition. At this point, therefore, we conclude that the YITS-PSIS differences remain unexplained thus far by the sort of particular longitudinal matching problems that have been suggested.

Assuming that the individuals for whom Statistics Canada has received records have in fact been correctly linked, this leaves the possibility of there being incomplete reporting on the part of at least some institutions in at least some years. If, however, this was an erratic reporting error over time, such as some individuals being missed in some years but not others at a given institution either because they were not reported at that institution or the entire institution did not report, we would expect continuing rates to be lower and leaving rates higher in the PSIS, with no clear implications for switching rates. But what we actually find is similar continuing rates, higher leaving rates, and lower switching rates in the PSIS. So this would not seem to explain the problem, although a variety of different biases might be trading off against each other, including the underlying response bias that one suspects has to affect the YITS results to at least some degree.

In the absence of any obvious explanations for the observed differences in switching rates – except that the lower leaver rates in the YITS can perhaps be at

least partly explained by survey response bias – we conclude that while some differences remain between the YIS and PSIS results, the estimated persistence rates are generally close enough not to cause us to doubt the quality of the PSIS data or the analysis that has been carried out with those data in any fundamental way.

Comparisons of returning rates

Let us now consider returning rates among leavers. First year returning rates among bachelor's students are, at 20.0 percent (Tables 13 and 14), considerably lower than the 35.6 percent first year rate found with the YITS for all of Canada reported in Finnie and Qiu (2008). But the detailed breakdowns are interesting, and possibly revealing in terms of identifying the potential sources of the differences in findings between the two datasets.

The number who return to the same institution is very similar in the two analyses: 12.5 percent in the YITS as compared to the 11.9 percent found here with the PSIS. But we find considerably lower rates in the PSIS data among others: those who move institutions, including moves to institutions out of the original province.

One reason for these differences would be that the YITS data are for all Canada (breaking out the results for this dynamic for Atlantic Canada is not possible due to the limited sample sizes in the YITS), along with the other fundamental differences in the YITS data as described above (i.e., they are limited to individuals in their first programs, etc.)

Another reason for the differences in the two sets of findings would be that students who move to enter new programs in institutions outside of Atlantic Canada are – as mentioned earlier – not captured in the PSIS, and this may be a significant group among leavers/returners. After all, those who leave PSE and then return might be expected to be a generally geographically mobile group given the instability in this other part of their lives. (Again, the relevant numbers cannot be determined with any accuracy in the YITS due to its more limited sample sizes in a situation where relatively few individuals are involved overall).

Otherwise put, the PSIS numbers understate the number who return to PSE after leaving to the degree these returners are doing so out of the Atlantic region. This said, the YITS findings would themselves (again) likely be subject to sample bias. So what we observe is the result of these, and any other, potential data limitations and problems.

Resolving this issue will, like the general overestimation of leavers and underestimation of switchers that is inherent in the Atlantic-only nature of the PSIS, require an expansion of the file to include data from the other provinces to which Atlantic Canada students move when they return to school (thus affecting returning rates), as much as when they switch from one program to another (thus affecting leaving and switching rates).

Checks that would be possible with data linkages

Another means of checking the PSIS would be to link it to other data sets and to directly compare students' PSE profiles in the two different sources. One such possibility would be an actual PSIS-YITS linkage. Since the PSIS is essentially a

persistence analyses carried out with the PSIS. Family income, family type, where the person lived before pursuing PSE, and other such information are some of the variables that could be added to the analyses.

In addition, individuals included in any LAD-PSIS linkage could continue to be tracked in the years after they leave PSE through their (LAD-based) tax files, thus opening up the possibility of linking PSE experiences to later outcomes, including labour market experiences, demographic profiles (marriage and child bearing), savings, and more. These are in fact the main objectives of the LAD-PSIS linkage as originally conceived, while using the LAD to help verify the PSIS data is a main recent idea. All of these purposes would be served were the linkage made and the linked file made available to i) check the PSIS and ii) use the linked file for analyses.

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Endnotes

1. For each institution, the underlying annual files cover one calendar year of student records, thus running 2001/2002, 2002/2003, 2003/2004, and 2004/2005. The greatest number of institutions' reporting periods run from April 30 or May 1. Others' begin in another day in April or May, or in June, and one starts July 1.
2. The authors are also engaged in research of a similar, complementary type using Statistics Canada's Youth in Transition Survey, their papers including Finnie and Qiu, forthcoming, 2008.
3. See, for example, Ferrar and Riddell (2004).
4. See Turner (2004) for a good discussion of the importance of the persistence dynamic in the context of the accumulation of human capital.
5. See Finnie et al, forthcoming, for a collection of recent papers on both access and persistence in Canada, including the paper by Mueller, which represents a more detailed and more technical literature review than the one provided here.
6. In fact, the two reasons are inherently related: concerns over persistence rates are relatively new largely because the empirical evidence that is the source of these concerns has previously been limited.
7. See Finnie and Qiu (forthcoming, 2008) for work using the YITS-B to study persistence. The authors' work is now being extended to the YITS-A.
8. The importance of these limitations is identified by studies for the United States which indicate that a significant number of students do indeed make such transfers. This is consistent with what Finnie and Qiu (forthcoming, 2008) have recently found for Canada.
9. The Consortium for Student Retention Data Exchange (CSRDE) is a cooperative group of colleges and universities that collects and analyzes retention and graduation data for institutional benchmarking purposes. These data are analysed for first-time, full-time degree seeking freshmen by the Center for Institutional Data Exchange and Analysis (C-IDEA) at the University of Oklahoma. Data are then made available to the 421 consortium members (including a small number of participating Canadian universities along with the great majority of American universities) to use for benchmarking with their peers for internal academic planning purposes.
10. In the health literature, where this approach was developed extensively before economists generally discovered it, the classic example is time to death, typically modelled from the point of becoming ill or otherwise being diagnosed with a malady (hence the term "hazard rate" – i.e., of death). In economics, outcomes analysed using this general approach include things such as time spent unemployed or in poverty, time to a job change, or time to marriage or child birth. The defining characteristic of the approach is that a person enters a state of "risk" (falling ill, becoming unemployed, starting a new job, moving into poverty, etc.) where the event in question (death, escaping unemployment or poverty) and the focus of the analysis is the probability of the relevant outcome (death, employment, a new job, escaping poverty) occurring at any given point after into the state of being at risk or, alternatively, the time it takes for the event to happen. The extension to a "competing risk" framework, where more than one type of transition is possible – as used here – is straightforward.
11. See Finnie and Qiu (2008) for an analysis that combines both approaches.
12. The student can then be followed in a new process from that point, as described below (i.e., returning to school among those who leave, going on to a new program among those who graduate).
13. This one-year framework is somewhat arbitrary, but corresponds to how the persistence dynamic is often framed.

14. Further attempting to identify program changes in a given institution, perhaps for a subset of institutions, would be one potential route for future research to go.

15. Someone who switched and then immediately dropped out and was thus not in school at the relevant year end date was classified as a leaver, not a switcher. This kept the analysis tractable, and consistent. There are, in any event, relatively few transitions of this type.

16. Having to put their data into this standardised format can represent a considerable burden for institutions, but the result is a dataset that has consistent information across institutions. The benefits of this consistency were abundantly apparent to the researchers while working on this project.

17. This cooperation has been fostered by two important intergovernmental institutions, CAMET (the Council of Atlantic Ministers of Education and Training) and MPHEC (the Maritime Provinces Higher Education Commission).

18. The equally recent and unique opportunities for studying persistence using the Statistics Canada's YITS datasets have been discussed above.

19. Such identifying information is then stripped from the files that are created for the analysis for reasons of confidentiality.

20. For both these reasons, including only new spells is the standard approach in hazard analysis.

21. The very few cases (about .7 percent) where the person had three programs or more in a given reporting year were deleted.

22. Seventy-three point four percent of all programs started in September or August, 9.5 percent in July, 5.3 percent in January, and a scattering in other months.

23. These rules were arrived at after conducting extensive checks of individual micro records and carrying out many sets of cross-tabulations. We are grateful to individuals in the Centre for Education Statistics at Statistics Canada for their assistance in these exercises, and to college and university representatives who explained their institutions' files during earlier presentations of this work.

24. This makes sense in a context where the limited programs offered in Prince Edward Island force some students to go out of province as they move through their studies.

25. Recall that those who are enrolled outside the Atlantic region are classified as leavers, not switchers, but the bias resulting from this limitation of the data appears to be small, as discussed further below.

26. Note that the declines from year 1 to year 2 are similar, in relative terms, in samples 1 and 2, thus suggesting we could probably extrapolate out to year 3 for Sample 2 based on the Sample 1 results, but this should only be done with caution, for obvious reasons.

27. This point is discussed further in Finnie and Qiu, 2008, where it is reinforced in their more detailed analysis of the detailed individual and situational factors observed to be associated with persistence patterns.

28. These cumulative transition rates are calculated using the hazard rates shown in Tables 2 and 3, and thus comprise a statistical representation of what happens taking into account individuals observed different numbers of years (and therefore left-censored in the underlying data), rather than tracking only the smaller samples of individuals observed for the (entire) indicated intervals. This is standard practice in hazard analysis, as explained earlier in the paper.

29. See Finnie, Laporte and Lascelles (2004) or Finnie and Mueller (2008) for access patterns by province.

30. See Burbidge and Finnie (2000).

31. The MESA project currently has a paper under preparation that attempts to get at how differences in universities' rules and regulations affect persistence rates (after taking students' characteristics into account). The authors may be contacted for further information on this work.

32. See Johnson (2008) for recent work on attempts to control for student characteristics when looking at K-12 school rankings. His work attempts to get at exactly this kind of problem.

33. It would be interesting to see how many students move when they enter PSE, but the information in the PSIS is probably not suitable for this. The reason is that what students give for their "home" or "permanent" address is of limited value for these purposes (i.e., to identify where they are from), even in first year. For example, it may be just a mailing address, it may be a local address, and so on. See Burbidge and Finnie (2000) for an analysis of this dynamic based on the National Graduates Surveys.

34. The relative shares of the different kinds of switchers – those who change level, those who change province – change somewhat in the second year (e.g., there is an increase in the proportion of level-changers among those who make a switch). But the changes are not great, and the overall number of switchers is even smaller than in year 1 (only 4.2 percent make any change at all), meaning that we are splitting relatively fine differences, so probably not too much importance should be attached to these changes.

35. Recall that leavers are defined as those who are not still/again enrolled one year after starting their programs (give or take a month).

36. These results should be regarded only as general patterns, rather than precise estimates, due to the smallish sample sizes derived from following those previously observed to leave PSE to see how many return, and where.

37. Staying at the same level but changing "institution" is almost impossible, by construction, in most cases, because each of the provinces has a unified college system, meaning there *is* only one institution in the province. There is "campus" information in the PSIS, but this information is, as far as the authors are aware, uneven across the file and has not been exploited, at least to date. This could be something to do in further work.

38. See Finnie (2004) for previous evidence on a comparable set of dynamics at the national level based on the National Graduates Surveys. The current analysis differs from that work in a number of important ways. Not only is it focused on the Atlantic region, but it also identifies new PSE program *starts*, whereas the NGS data identify only (additional) *completed* PSE programs in the two or five years after graduating from a first program.

39. The coding in the PSIS dataset of "non-regular" and "below PSE" programs leaves some ambiguity as to the nature of these programs. All such programs are delivered by a PSE institution (most often in a college), but their "below PSE" designation comes from following standard reporting conventions, indicating they are not the same as other "regular" PSE programs.

Culture, Tourism and the Centre for Education Statistics

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Cumulative index

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